1934

SEALE-HAYNE AGRICULTURAL COLLEGE

NEWTON ABBOT, DEVON

DEPARTMENT OF PLANT PATHOLOGY

ELEVENTH ANNUAL REPORT

FOR THE YEAR ENDING SEPTEMBER 30th, 1934

Pamphlet No. 44.

COMMONWEALTH MYCOLOGICAL INSTITUTE
20 MAY 1955

Mid-Devon Newspaper Co., Ltd., Newton Abbot.

SEALE-HAYNE AGRICULTURAL COLLEGE.

Department of Plant Pathology.

Advisory Entomologist :

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Advisory Mycologist :

A. BEAUMONT, M.A. (Cantab)

Eleventh Annual Report of the Department of Plant Pathology.

ADVISORY WORK.

Statistics of advisory letters and visits are as follows:—

Advisory Letters	*Entomological.*	*Mycological.*
Devon	117	130
Cornwall	59	60
External	58	60
Total	234	250
Advisory Visits.		
Devon	151	63
Cornwall	91	53
Total	242	116

LECTURES.

During the Winter the Entomologist gave twenty lectures to students of the College, viz., a course of ten lectures on "The Principles of Insect Pest Control" to second year students, and a course, also of ten lectures, on "Farm Pests" to Short Course Students.

Two lectures and demonstrations on "The Dissection of Bees for Acarine Disease" were given to the Short Course in Beekeeping held at the College from September 15th—18th, under the auspices of the Devon and Cornwall Beekeepers' Association.

The following lectures have been given by the Entomologist to farmers' and growers' organisations in the Province:—

1933.		
Nov. 3.	Dawlish.	"Violet Pests during the Season."
,, 30.	Elburton.	"Pests of Tomatoes and Beans under Glass."
1934.		
Feb. 5.	Grower's meeting (Seale Hayne College).	"Tarsonemus —a New Pest of Bulbs."
,, 8.	Exeter.	"Strawberry Pests."
16.	Torquay.	"Narcissus Pests."
,, 26	Bere Alston.	"Bulb Pests."

March 2. Dawlish. "Selection of Runners in Relation to Violet Pests."
„ 8. Plymouth. "Vegetable Pests."
April 17. Newton Abbot. "Allotment Pests."
Sept. 3. Newton Abbot. "Flea Beetles."

A paper on "Violet Eelworm" was given at the Advisory Entomologists' Conference in London.

The Mycologist gave a course of lectures in the College to third year students in the Michaelmas Term and a course in the Lent Term to Short Course Students.

External lectures were as follows:—

1933.
Nov. 23. Elburton. "Diseases of Tomatoes."
1934.
Jan. 12. Dawlish. "Diseases of Anemones and Violets."
Feb. 22. Exeter. "Bulb Diseases."
Mar. 3. Newton Abbot. "Daffodils."
Sept. 27. Berry Pomeroy. Teign Naturalists' Fungus Foray.

A paper on "The Relation of Weather Type to Disease Epidemics" was given at the Advisory Mycologists' Conference in London in September, and one on "Diseases of Narcissi and Tulips" at the Revision Course in Horticulture at Reading University in the same month.

SHOWS.

Exhibits were staged at the Commercial Horticultural Shows at Penzance in March and Plymouth in April, and at the Royal Horticultural Society's Flower Show at Chelsea and the Devon County Agricultural Show at Seale-Hayne College in May.

"POTATO SICKNESS."

Potato Sickness associated with the eelworm *Heterodera schachtii*, continues to cause much concern amongst growers, especially in allotments. Fresh cases of infection of land occur from time to time and many are clearly due to the planting of infected seed. Where seed is infected the eelworms are present in the encysted stage, adhering to the outside of the potatoes in soil. Growers whose land is free from infection are strongly advised to wash seed thoroughly in cold water prior to sprouting and planting, *so as to remove all earth and eelworm cysts*.

Work on manurial and other soil treatments continues in collaboration with the Advisory Chemist and some striking

results have been obtained by the use of heavy dressings of sulphate of potash or calcium cyanamide at different centres. The results thus obtained, however, bear a definite relation to the effects of the manure on the balance of the soils, as shown by analysis. Such treatment can only, therefore, be suggested in certain cases where analysis points to their probable value. There is little evidence as yet that such treatments will be of great value where potatoes are grown regularly every year, as is the case with allotments.

LOGANBERRY CANE MAGGOT.

A full account of this unusual pest of loganberries has now been published in the Journal of the Ministry of Agriculture (May 1934). Reference to this pest was made in the Tenth Annual Report of this Department (page 4). The maggots responsible for the tunnelling, and consequent wilting of the shoots, have now been bred to the fly stage at the Ministry of Agriculture Plant Pathological Laboratories and at this College. The flies have been identified by Mr. J. E. Collin as *Phorbia rubivora* Coq. This pest is the same as the Raspberry Cane Maggot, which is a serious pest in America, though there is a considerable amount of evidence to show that the insect is indigenous in the British Isles and several isolated cases of injury have been put on record as far back as 1912. It is also possible that this insect may occur on certain wild host plants and this question is being investigated.

At the centre in S. Devon where the pest occurred on loganberries, it was found out that the very thorough cutting out and destruction of infested shoots resulted in a great reduction in the number of attacked shoots the following year. The pest can now, for all practical purposes, be said to have been eradicated, provided that the grower still exercises care in cutting out the very small number of attacked shoots when these are seen.

HOT WATER TREATMENT OF BULBS AND PLANTS.

Work on Hot Water Treatment continues to occupy much time and Mr. D. R. Barber of the Department of Physics is collaborating with the Advisory Entomologist. The scope of the investigation has been greatly extended with the aid of a grant from the Ministry of Agriculture. Special apparatus has been designed and contructed which consists of a series of delicate thermocouples with which accurate measurements can be made of the rates of heating of bulbs in any part of a bulb bath and also of temperatures and temperature fluctuations of water in any part of the bath. A number of observations on these lines has been made and the results show that there are several problems of great importance relating to the bulb baths as distinct from the problems concerned with the bulbs themselves.

With the aid of the thermocouple apparatus more information has been accumulated on the rates of heating of bulbs of various sizes and the relation between the circumference of bulbs and their rate of heating. A considerable amount of additional data on the killing of eelworms in hot water has been obtained and this has been supplemented by data on the effectiveness of a chemical added to the hot water. The addition of chemicals to the water of bulb baths would seem to offer considerable scope for further investigation.

Similar problems to those described above are being investigated in connection with strawberry and violet runners.

The College has placed an additional laboratory at the disposal of this Department in which all work on hot water treatment is carried out, so that the facilities for this work have been greatly increased.

It is proposed to carry out Hot Water Treatment with a variety of bulbs and plants as opportunity permits. For example, the work on potatoes described in the Tenth Annual Report, will be extended, and last year Iris bulbs, variety Imperator, were treated at weekly intervals. The bulbs were treated at 110 degrees F. for 50 minutes, which was the time that would be necessary to kill Bulb Eelworm in the particular bath used, the calculation being based on the size of the bulbs. The dates of treatment were August 24th, September 1st, September 12th, September 19th, September 26th, October 3rd, and all the bulbs, including the control untreated, were planted on October 16th, 1933. The crop in June 1934 was in every respect, as good as the control and the date of flowering was slightly earlier. There was a number of gaps but not greater than in the control. It may be concluded therefore, that Iris bulbs may safely be treated for periods up to 1 hour at 110 degrees F.

NARCISSUS FLIES.

Further experiments on the use of various deterrent dusts against Narcissus Flies have been carried out. Owing to exceptionally hot weather conditions during the "fly season" the dusts did not remain effective for such long periods as during the previous year. When weather conditions were at their hottest the dusts were only effective for a period of five days. This would necessitate rather more dustings being done than would be economically practicable. Further tests will be made next season and the strength of the dusts will be increased in order to increase the period of effectiveness during hot periods of weather. The results of two seasons' trials suggest that deterrent dusts give considerable promise of being a satisfactory method of solving the problem of the control

of Narcissus Flies, when combined with early raking down of beds, as soon as the foliage is in a fit state for this operation to be carried out.

VIOLET PESTS.

Violet Eelworm (*Aphelenchoides olesistus*) still remains an important problem. Preliminary hot water treatment experiments with runners showed that plants could be freed from eelworm without injury to the plants themselves. These preliminary experiments were carried out with the aid of a small electrically heated bulb bath. Further experiments on a larger scale were carried out with a small commercial bulb bath, but the results were not satisfactory. It is clear that several problems are involved when larger quantities of runners are treated and these problems are under investigation (see above section on Hot Water Treatment.)

So far as Violet Aphis (*Myzus ornatus*) is concerned, successful methods of controlling this pest prior to the flowering season have been devised. These consist of stripping the foliage and spraying with contact washes containing nicotine. The control of the aphis after flowering has commenced, presents special difficulties, since nicotine sprays have been found to retard flowering; in addition, the aphids are hidden inside the opening flowers and it is impossible to wet them with a spray. Work on this pest has, therefore, consisted largely in attempting to devise means for dealing with the aphis during the flowering season and satisfactory progress is being made.

PUBLICATIONS.

L. N. Staniland.

"Violet Eelworm" (Seale-Hayne College Monthly Bulletin, No. 45, January, 1934.)

"The Prospects for Commercial Violet Growing" (Commercial Florist, Nov. 18, 1933, p. 731).

"Red Spider Attacks on Violets" (Commercial Florist, Feb., 1934, pp. 120-121).

"The Violet Aphis" (Commercial Florist, March, 1934, p. 165.)

"Violet Eelworm" (Commercial Florist, June, 1934, p. 323.)

"Bulb Sterilizing Routine" (Commercial Florist, August, 1934, pp. 413-415.)

"The Loganberry Cane Maggot" (Journ. Min. Agric., May, 1934, pp 151-153.)

By L. N. STANILAND and T. GOODEY.

"A Dwarfing Disease of Cultivated Violets associated with the Eelworm, *Aphelenchoides olesistus*," (Journal of Helminthology, XII, 1934, pp. 13-22.)

By A. BEAUMONT

"On the Relation between the stage of Development of the Potato Crop and the Incidence of Blight (*Phytophthora infestans*)" (Ann. App. Biol. XXI, 1934, pp. 23-47.)

"The Control of Tulip Fire" (Seale-Hayne College Monthly Bulletin, No. 47, March 1934.)

"Hot Water Treatment of Bulbs" (Seale-Hayne College Bulletin, No. 51, August, 1934.)

Notes on Pests during the Year.

CEREALS.

Pests of cereals have not been of great importance during the year. Slug damage has been slight owing to dry conditions, though some damage has occurred during slight wet spells of weather. Wheat Midges have caused some losses in S. Devon, and a case of Hessian Fly was noted in the Truro district. The usual cases of wireworm have occurred, but these have been of a normal character.

POTATOES AND ROOTS.

Potato Sickness (*Heterodera schachtii*) continues to spread and few groups of allotments are free from some infection. The infected areas in the early potato growing area of West Cornwall have now largely been laid down to grass in an attempt to rid the soil of infection. Damage to potatoes by Capsid Bugs has been markedly less severe than last year. A fair amount of damage by earwigs to the foliage of potatoes has occurred, particularly on allotments.

The main trouble with roots such as mangolds and turnips has been Flea Beetle attacks ; Flea Beetles have been exceptionally serious. Seed dressings of various kinds, such as paraffin, asafoetida and the dressing recommended by Long Ashton, have on occasions given good results, but temperatures were high and germination was so slow that the dressings had lost their efficiency before the seedlings appeared. Several farmers have reported excellent results from drilling flowers of sulphur with the seed.

BRASSICAE.

Cabbage Root Fly (*Chortophila brassicae*) was fairly serious throughout the province and was more prevalent than last year, but the damage caused was not so serious as in earlier years. The dipping of plants in corrosive sublimate solution is now more widely carried out.

Cabbage Stem Flea Beetle (*Psylliodes chrysocephala*) is becoming very severe on broccoli in West Cornwall.

Cutworms were again the cause of much loss to broccoli, though the attacks were not general.

Cabbage White Fly (*Aleurodes brassicae*) was again severe, but less marked than the previous year and definite losses were not so common. This pest was more prevalent on broccoli and Brussels Sprouts. Cabbage Aphis (*Brevicoryne brassicae*) was especially marked on broccoli in West Cornwall, but the advent of rain stimulated the plants to rapid growth and little severe damage occurred. Caterpillar attacks, mostly the Large White (*Pieris brassicae*) were severe locally. Some bad cases of damage to seeding broccoli by Blossom Beetles (*Meligethes aeneus*) were again noted.

PULSE.

Peas again suffered severely from attacks by Pea Thrips. Bean Aphis (*Aphis rumicis*) was definitely more severe than during the previous year.

Isolated cases of eelworm attacks on peas (*Heterodera schachtii*) were noted in S. Devon and in the Redruth district of Cornwall. An attack of Clover Weevils (*Apion sp.*) took place on a crop of clover near Truro. Parsnips in the St. Just area of W. Cornwall were found to be suffering from attacks of the Parsnip Webworm (*Depressaria heracliana*). This pest was not seen elsewhere in the Province.

OTHER VEGETABLES.

Cutworms and leatherjackets caused losses to lettuce in West Cornwall and a number of cases of Lettuce Root Aphis (*Pemphigus bursarius*) were noted in Cornwall and S. Devon; this pest produced marked patches of stunted plants which failed to form hearts. Carrots and Onions were very free from pests, though onions were attacked by cutworms in S. Devon. Several cases of Tomato Eelworm occurred in Cornwall and Devon. Greenhouse White Fly was very severe where insufficient steps were taken to reduce their numbers. White Fly Parasite (*Encarsia formosa*) has been imported into a number of glasshouses with marked success. An interesting case of the unexpected appearance of this parasite in a greenhouse at Torquay occurred. The nearest known stock of this parasite is at Seale-Hayne College, a distance of 10 miles. The grower had imported no plants and the manner in which the parasite reached his house remains a mystery. An attack of White Fly commenced but the parasite made its appearance and completely controlled the pest.

Rhubarb was severly attacked by Black Aphis (*Aphis rumicis*) in S. Devon.

FRUIT.

Pests of top fruit were mostly of normal appearance. Apple Sawfly (*Hoplocampa testudinea*) was somewhat commoner than last year. Woolly Aphis was again severe, but attacks of other apple aphids were of normal intensity. Permanent Apple Aphis was somewhat more severe than it was during the previous year in parts of S. Devon. Apple Capsid Bug (*Plesiocoris rugicollis*) was again troublesome, and some marked failures to control this pest by means of tar oil and petroleum washes occurred. Winter Moth damage was slight.

Thrips attacked the tips of the shoots of apples at two centres in E. Devon, and caused considerable stunting of the growths. Red Spider attacks on Apple have been rather more widespread than in the previous year, and many trees are now bearing large numbers of eggs.

Codlin Moth (*Cydia pomonella*) has led to a number of complaints, and this pest appears to be increasing to some extent ; much of the damage has been caused by second brood larvae.

Some severe cases of Pear Midge have been noted in S. Devon. Pear Slugworm has been rather more common than usual. Plum Slugworm has been rather more common than usual. Plum Sawfly caused some loss in N. Devon. Peaches under glass suffered exceptionally severely from Red Spider attacks.

Capsid Bug damage to Black Currants was locally severe in S. Devon ; the species concerned was principally *Lygus pabulinus*.

Raspberry Shoot Moth (*Incurvia rubiella*) does not seem to have made further progress in the Province, and the Raspberry and Loganberry Beetle (*Byturus tomentosus*) continues to give very little trouble.

The Raspberry Cane Borer reported on Loganberries near Dawlish during the previous year was bred out at the Pathological Laboratories, and also by the Adviser. The fly was an Anthomyiid, and proved to be *Phorbia rubivora*, but it was clear that it had not to be regarded as an introduced insect, but an indigenous species which had increased in that district. It was found that the very thorough cutting out and destruction of infected shoots resulted in a very great reduction in the number of attacked shoots the following year ; the pest can now, for all practical purposes, be said to have been eradicated, provided that the grower still exercises care in cutting out the very small number of attacked shoots when these are seen,

The most serious pest on strawberries during the year was Red Spider (*Tetranychus telarius*). Very little trouble was experienced with Strawberry Aphis (*Capitophorus fragariae*). Some severe infestations of Strawberry Mite (*Tarsonemus fragariae*) were seen. In Devon some considerable losses of plants took place as the result of attacks by Cockchafer larvae on newly broken land. Thrips also caused damage to strawberries in Devon and Cornwall. Millipedes again attacked the ripe fruit of strawberries in E. Devon. Treatment with solutions of calcium cyanide was found to be ineffective.

FLOWERS.

Damage to narcissus bulbs by eelworm (*Anguillulina dipsaci*) was of normal intensity, but growers are treating their bulbs with hot water to an increasing extent, and the eelworm situation is better than formerly. There were a number of cases of the appearance of eelworm after hot water treatment of the bulbs, even when the bulbs were planted on land which had never grown bulbs before. Recent work by the Adviser suggest that some of these cases were probably due to inefficiency on the part of the baths employed, but it is felt that the question of infected weeds is likely to be of great importance.

Narcissus Flies (*Merodon and Eumerus*) were exceptionally severe throughout the Province.

Bulb Scale Mite (*Tarsonemus approximatus, var. narcissi*) again proved very troublesome to forcers, and there is no doubt but that this pest is likely to make the growing of bulbs for the forcing trade a matter of some difficulty.

A small collection of Thrips from the flowers of narcissus was made at Seale-Hayne College. In view of the possible importance of these insects as vectors of " Stripe disease " the collection was sent to Mr. E. R. Speyer at the Experimental Station, Cheshunt, for identification. The species comprised the following :— *Frankliniella intonsa, Taeniothrips atratus, Thrips calcaratus, T. Flavus, T. major, and T. fuscipennis.* Of these species, *Thrips flavus and T. major* were by far the most numerous.

No cases of infection of Iris bulbs with eelworm (*A. dipsaci*) have come to the notice of the Adviser in the South Western Province, although a special look out has been kept for it. Iris bulbs have been grown in infected ground at the College, but no eelworm infection in the plants has been found.

Anemones suffered from severe attacks by Cutworms (*Agrotis spp.*) from wireworm attacks (*Agriotes spp.*) and also from infestations of the Violet Leaf and Flower Aphis (*Myzus ornatus*) which resulted in the production of deformed flowers. Capsid Bugs (species undetermined) were present on anemones near Truro, but caused no appreciable damage.

Violets were again found to suffer from attacks of Violet Eelworm (*Aphelenchoides olesistus*), and few stocks were found to be free of infection. Losses in flowers due to this eelworm were in some cases very severe. This eelworm was also responsible for heavy losses in connection with Parma Violets grown under frames in West Cornwall; this is the first record of this pest attacking Parma Violets. The year, being hot and dry, was a very propitious one for Red Spider, and in many instances beds of violets were only saved by persistent stripping of the leaves and spraying. Violet Aphis (*Myzus ornatus*), however, gave little trouble, the conditions not being sufficiently moist. The pest was present, but actual damage was slight. Wireworms caused losses of violet plants in West Cornwall, and cases also occurred of leather-jacket injury.

Polyanthus, in common with violets and other plants, were very heavily infested with Red Spider, and young plants were severely checked.

Attacks on Chrysanthemum by the eelworm (*Aphelenchoides ritzema-bosi*) have been more common, and this pest is clearly spreading. The hot water treatment of stools has given satisfactory control

In the case of other flowers, Wallflowers and Stocks were again attacked by the Cabbage Root Fly (*Chortophila brassicae*), though the attacks were not so generally severe as during the previous year. Stocks were in one case found to be severely injured by the Cabbage Stem Flea Beetle (*Psylliodes chrysocephala.*)

Capsid Bugs (*Lygus pabulinus*) were troublesome on Dahlias. Cyclamens were damaged at several centres in Devon and Cornwall, by the Vine Weevil (*Otiorrhynchus sulcatus.*)

Bees.

Acarine Disease of Bees (*Acarapis woodi*) was even slighter than in the previous year. Very few samples of bees were sent in as suspect, and the majority of these were found to be free from infection.

INSECT PESTS RECORDED AS CAUSING DAMAGE TO CROPS IN THE SOUTH WESTERN PROVINCE (CORNWALL AND DEVON) DURING THE TEN YEARS 1924-1934.

In this list the pests are set out under food plants. The scientific name of each pest is given, together with the popular name ; where no popular name is known,a note is included indicating the type of insect. It is not considered that this list is complete, it having been compiled solely from reports and observations of actual cases of injury occurring within the Province. It is hoped that the inclusion of popular names will be found of especial value to farmers and growers, and that the list will assist them by indicating the range of pests which may be responsible for losses.

CEREALS.

Crops.	Pest.	English Name.
Wheat.	*Agriotes spp.*	Wireworm.
	Sitodiplosis mosellana, Gehim.	Wheat Midge.
	Contarinia tritici, Kirby.	Wheat Midge.
	Chlorops taeniopus, L.	Gout Fly.
	Phorbia genetalis (Schnabb)	Shoot Boring Maggot.
	Lema melanopa, Linn.	Leaf-eating Beetle.
	Cephus pygmaeus, Ste.	Stem Sawfly.
	Tylenchus tritici, Drij.	Ear Cockle.
	Agriolimax agrestis, Linn.	Grey Field Slug.
	Arion hortensis, Linn.	Garden Slug.
Oats.	*Agriotes spp.*	Wireworm.
	Lema melanopa, Linn.	Leaf Eating Beetle.
	Thrips sp.	Corn Thrips.
	Aphis avenae, Fab.	Oat Aphis.
	Macrosiphum granarium, Kirby.	Grain Aphis.
	Apamea secalis, Bjerk.	Common Rustic Moth.
	Phytomyza nigra, Mg.	Leaf Miner.
	Centor myopinus, Meig.	Small Fly Maggots.
	Tipula oleracea, Linn, and *paludosa*, Mg.	Leatherkackets.
	Oscinella frit, Linn.	Frit Fly.
	Cephus pygmaeus, Ste.	Stem Sawfly.
	Anguillulina dipsaci, Kuhn.	Stem Eelworm.
	Arion hortensis, Linn.	Garden Slug.
	Agriolimax agrestris, Linn.	Grey Field Slug.

Crop.	Pest.	English Name.
Barley.	*Lema melanopa*, Linn.	Leaf-eating Beetle.
	Phyllotreta vittula, Redt.	Flea Beetle.
	Tipula oleracea, Linn, and *paludosa*, Mg.	Leatherjackets.
	Chlorops taeniopus, L.	Gout Fly.
	Oscinis frit L.	Frit Fly.
	POTATOES.	
Potato.	*Agriotes spp.*	Wireworm.
	Blitophaga opaca, L.	Beet Carrion Beetle.
	Calocoris norvegicus, Cymel.	Potato Bug.
	Lygus pratensis, Fab.	Tarnished Plant Bug.
	Lygus pabulinus, Linn.	Common Green Capsid Bug.
	Myzus persicae, Sulz.	Potato and Peach Aphis.
	Myzus pseudosolani, Theob.	Potato Aphis.
	Eupteryx auratus, Linn.	Leaf Hopper.
	Chlorita viridula, Fall.	Leaf Hopper.
	Hydroecia micacea, Esp.	Rosy Rustic Moth.
	Heterodera schachtii, Schm.	Potato Eelworm.
	Blanjulus guttulatus, Gerv.	Millipede.
	ROOTS.	
Mangold.	*Bourlettiella hortensis*, Fitch.	Springtails.
	Agriotes spp.	Wireworms.
	Atomaria linearis, Steph.	Pigmy Mangold Beetle.
	Cassida vittata, F	Tortoise Beetle.
	Cassida flaveola, Thumb.	Tortoise Beetle.
	Plectoscelis concinna, Marsh.	Flea Beetle.
	Plusia gamma, L.	Silver Y Moth.
	Euxoa segetum, Schiff.	Cutworm.
	Agrotis spp.	Cutworm.
	Hadena oleracea, L.	Bright-Line Brown-Eye Moth.
	Pegomyia hyoscyami, Panz.	Mangold Fly.
	Tipula spp.	Leatherjackets.
	Fannia sp.	Lesser House Fly.
Turnips and Swedes.	*Agriotes spp.*	Wireworms.
	Phyllotreta vittula, Redt.	Flea Beetle.
	Phyllotreta nemorum, Linn.	Flea Beetle.
	Plectroscelis concinna, Marsh.	Flea Beetle.

Crops.	Pest.	English Name.
Turnips and Swedes.	*Ceuthorrhynchus pleurostigma*, Marsh.	Turnip Gall Weevil.
	Pieris brassicae, Linn.	Cabbage White Butterfly.
	Chortophila brassicae, Byhe.	Cabbage Root Fly.
	Contarinia nasturtii, Kieff.	Swede Midge.
Sugar Beet.	*Plectroscelis concinna*, Marsh.	Flea Beetle.
	Atomaria linearis, Steph.	Pigmy Mangold Beetle.
	Pegomyia hyocyami, Panz.	Mangold Fly.
	PULSE.	
Pea.	*Frankliniella robusta*, Uzal.	Pea Thrips.
	Blitophaga opaca, L.	Beet Carrion Beetle.
	Cydia nigricana, Steph.	Pea Moth.
	Contarinia pisi, Winn.	Pea Midge.
Field Beans.	*Sitones hispidulus*, Fab.	Bean Weevils.
	Bruchus rufimanus, L.	Broad Bean Beetle.
	Euxoa segetum, Schiff.	Cutworm.
	Tipula paludosa, Mg.	Leatherjacket.
Runner Beans.	*Isotoma sp.*	Springtails.
	Phyllobius pyri, Steph.	(Leaf-eating Weevil).
	Lygus pabulinus, Linn.	Common Green Capsid Bug.
	Calocoris norvegicus, Fab.	Potato Bug.
	Aphis rumicis, Linn.	Black Bean Aphis.
	Trialeurodes vaporariorum, Westw.	Greenhouse White Fly.
	Aleurodes brassicae, Walk.	Cabbage White Fly.
	Chortophila fusciceps (Zett)	(Seed Maggot).
	Tetranychus telarius, Linn.	Red Spider.
	Isopoda.	Woodlice.
Soya Bean.	*Sitones lineatus*, Linn.	Bean Weevil.
	CLOVERS.	
Clover.	*Apion apricans*, Herbst.	Clover Weevil.
	Apion trifolii, Linn.	Clover Weevil.
	Sitones lineatus, Linn.	Bean Weevil.
	Phytonomus nigrirostris, Fab.	Clover Leaf Weevil.
	Dasyneura trifolii, F. Lw.	Clover Seed Midge.
	Agriolimax agrestris, L.	Grey Field Slug.
	Arion hortensis, L.	Garden Slug.

VEGETABLES.

Crops.	Pest.	English Name.
Brassicae (including Broccoli, Savoy, Cabbage, Brussels Sprouts, etc.)	*Bourletiella hortensis*, Fitch.	Springtails.
	Ceuthorrhynchus pleurostigma, Marsh.	Turnip Gall Weevil.
	Ceuthorrhynchus assimilis, Payk.	Turnip Seed Weevil.
	Phyllotreta, atra, L.	Flea Beetle.
	Phyllotreta vittula, L.	Flea Beetle.
	Plectroscelis concinna, Marsh.	Flea Beetle.
	Psylliodes chrysocephala, Linn.	Cabbage Stem Flea Beetle.
	Melegethes aeneus, F.	Blossom Beetles.
	Brevicoryne brassicae, Linn.	Cabbage Aphis.
	Aleurodes brassicae, Walk.	Cabbage White Fly.
	Pieris brassicae, Linn.	Cabbage White Butterfly.
	Mamestra brassicae Linn,	Cabbage Moth.
	Plutella maculipennis, Curb.	Diamond Back Moth.
	Chortophila brassicae, Bche.	Cabbage Root Fly.
	Platycirus albimanus, Feb.	(A Hover Fly).
	Blanjulus pulchellus, Leach.	Millipede.
	Helix pomatia, L.	Snail.
Carrot.	*Anuraphis dauci*, Fab.	Carrot Aphis.
	Cavariella capreae, F.	Carrot and Willow Aphis.
	Thereva lunulata, Zett.	(Maggots of a Fly).
	Psila rosae Fab.	Carrot Fly.
Celery.	*Cavariella pastinacea*, L.	Aphis.
	Acidia heraclei, Linn.	Celery Fly.
	Psila rosae, Fab.	Carrot Fly.
Lettuce.	*Pemphigus bursarius*, Linn.	Lettuce Root and Poplar Gall Aphis.
	Trama troglodytes, Hey.	Lettuce Root Aphis.
	Agrotis spp.	Cutworms.
	Tipula spp.	Leatherjackets.
	Agriolimax agrestis, Linn.	Grey Field Slug.
	Arion hortensis, Linn.	Garden Slug.
Onion'	*Agrotis spp.*	Cutworms.
	Hylemyia antiqua, Meig.	Onion Fly.
	Anguillulina dipsaci, Kuhn.	Bulb Eelworm.

Crops.	Pest.	English Name.
Parsnip.	*Depressaria heracliana*, De G.	Parsnip Webworm.
	Acidia heraclei, Linn.	Celery Fly.
	Psila rosae, Fab.	Carrot Fly.
Cucumber.	*Thrips sp.*	Thrips.
	Isopoda.	Woodlice.
Tomato.	*Agriotes spp.*	Wireworms.
	Thrips spp.	Thrips.
	Myzus circumflexus, Buckt.	Greenhouse Aphis.
	Erythroneura parvula, Boh.	Leaf Hopper.
	Trialeurodes vaporariorum, Westw.	Greenhouse White Fly.
	Hadena oleracea, B.	Tomato Moth.
	Tetranychus telarius, L.	Red Spider.
	Blanjulus pulchellus, Leach.	Millipedes.
	Scutigerella immaculata, Newp.	Garden "Centipede."
	Heterodera marioni, Goodey.	Root-knot Eelworm.
	Isopoda.	Wood Lice.
Rhubarb.	*Aphis rumicis*, L.	Black Bean Aphis.
	Plectroscelis concinna, Marsh.	Flea Beetle.

FRUIT.

Apple.	*Anthonomus pomorum*, Linn.	Apple Blossom Weevil.
	Otiorrhynchus picipes, Fab.	Clay-coloured Weevil.
	Phyllobius pyri, L.	(A Leaf Weevil).
	Phyllobius oblongus ,Linn.	Brown Leaf Weevil.
	Scolytus rugulosus, Ratz.	Bark Beetle.
	Xyleborus dispar, Fab.	Shot Borer Beetle.
	Thrips spp.	Thrips.
	Plesiocoris rugicollis, Fall.	Apple Capsid Bug.
	Lygus pabulinus, L.	Common Green Capsid Bug.
	Psylla mali, Schm.	Apple Sucker
	Eriosoma lanigerum, Hgt.	Wooly Aphis.
	Anuraphis roseus, Baker.	Rosy Apple Aphis.
	Aphis pomi, De G.	Permanent Apple Aphis
	Aphis rumicis, L.	Black Bean Aphis.
	Lepidosaphes ulmi, Linn.	Mussel Scale.
	Pseudococcus aceris, Sig.	Mealy Bug.
	Leptophyes punctatissima, Bosc.	(A Grasshopper).
	Malacosoma neustria, Linn.	Lackey Moth.

Crops.	Pest.	English Name.
Apple.	*Cydia pomonella*, Linn.	Codlin Moth.
	Anisopteryx ascularia, Sch.	March Moth.
	Hyponomeuta padella, L.	Small Ermine Moth.
	Lasiocampa quercifolia, L.	Lappet Moth.
	Acromycta rumicis, L.	Knot Grass Moth.
	Cheimatobia brumata, Linn.	Winter Moth.
	Hybernia defoliaria, Clerck.	Mottled Umber Moth.
	Orygia antiqua, Linn.	Vapourer Moth.
	Smerinthus occellatus, Linn.	Eyed Hawk Moth.
	Tortricidae.	Tortrix Moths.
	Ornix petiolella, Sta.	Apple Leaf Blister Moth.
	Coleophora spp.	Case-Bearer Caterpillar.
	Lyonetia clerkella, Linn.	Apple Leaf Miner.
	Oligonychus ulmi, Koch.	Fruit Tree Red Spider.
	Hoplocampa testudinea, Hgt.	Apple Sawfly.
	Tetranychus telarius, L.	Red Spider.
Pear.	*Phyllobius maculicornis*, Germ.	(A Leaf Weevil).
	Phyllobius pyri, Steph.	(A Leaf Weevil).
	Phyllobius oblongus, L.	Brown Leaf Weevil.
	Thrips sp.	Thrips.
	Psylla simulans, Forst.	Pear Sucker.
	Anuraphis crataegi, Kalt.	Rosy Leaf-curl Aphis.
	Cydia pomonella, L.	Codlin Moth.
	Tortrix forsterana, F.	Tortrix Moth.
	Contarinia pyrivora, Riley.	Pea Midge.
	Eriocampa limacina, De G.	Pear Slugworm.
	Vespa spp.	Wasps.
	Eriophyes pyri, Pagst.	Pear Leaf-blister Mite.
Plum.	*Phyllobius oblongus*, Linn.	Brown Leaf Weevil.
	Otiorrhynchus tenebricosus, Herbst.	Red Legged Weevil.
	Xyleborus dispar, F.	Shot Borer Beetle.
	Thrips spp.	Thrips.
	Anuraphis helychrysi, Kalt.	Leaf Curling Plum Aphis.
	Hyalopterus pruni, Fab.	Mealy Plum Aphis.
	Orygia antiqua, Linn.	Vapourer Moth.
	Cheimatobia brumata, L.	Winter Moth.
	Hoplocampa flava, L.	Plum Sawfly.
	Eriocampa limacina, De G.	Slugworm.
	Paratetranychus pilosus, Can.	Red Spider.
	Oligonychus ulmi, Koch.	Fruit Tree Red Spider.

Crops.	Pest.	English Name.
Currant (Red and Black).	*Lygus pabulinus*, Linn.	Common Green Capsid Bug.
	Plesiocoris rugicollis, Fall.	Apple Capsid Bug.
	Lygus pratensis, Fab.	Tarnished Plant Bug.
	Eriosoma ulmi, Linn.	Currant Root Aphis.
	Myzus lactucae, Kalt.	Currant Aphis.
	Capitophorus ribis, Linn.	Hairy Currant Aphis.
	Lecanium capreae, Linn.	Brown Soft Scale.
	Lecanium hemisphericum, L.	Brown Scale.
	Pulvinaria vitis, var. ribesii, Sign.	Vine Scale.
	Aegeria tipuliformis, Cl.	Currant Clearing Moth.
	Abraxas grossulariata, Linn.	Magpie Moth.
	Orygia antiqua, Linn.	Vapourer Moth.
	Anisopteryx aescularia, Schiff.	March Moth.
	Cheimatobia brumata, L.	Winter Moth.
	Nematus ribesii, Scop.	Gooseberry Sawfly.
	Eriophyes ribis, Nal.	Big Bud Mite.
	Aphelenchoiles ribis, Taylor.	Black Currant Eelworn.
Gooseberry.	*Plesiocoris rugicollis*, Fall.	Apple Capsid Bug.
	Aphis grossulariae, Kalt.	Gooseberry Aphis.
	Capitophorus ribis, L.	Hairy Currant Aphis.
	Pulvinaria vitis, var. *ribesii*, L.	Vine Scale.
	Abraxas grossulariae, Linn.	Magpie Moth.
	Nematus ribesii, Scop.	Gooseberry Sawfly.
	Bryobia nobilis, Thorn.	Gooseberry Red Spider.
Raspberry and Logan-berry.	*Byturus tomentosus*, F.	Raspberry Beetle.
	Palomena prasina, L.	Shield Bug.
	Amphorophora rubi, Kalt.	Raspberry Aphis.
	Incurvaria rubiella, Bjerk.	Raspberry Shoot Moth.
	Lasioptera rubi, Schrk.	Raspberry Gall Fly.
	Phorbia rubivora, Coq.	Raspberry Cane Maggot.
	Fenusa pumilio, Hgr.	Raspberry Leaf Mining Sawfly.
	Emphytus cinctus, Klug.	Snag Boring Sawfly.
	Cladius brullaei, Dom.	Raspberry Sawfly.
Strawberry.	*Otorrhynchus sulcatus*, Fab.	Vine Weevil.
	Exomias areniformis, Schrarch.	Small Strawberry Weevil.

Crops.	Pest.	English Name.
Strawberry.	*Anthomonus rubi*, Herbst.	Strawberry Blossom Weevil.
	Melolontha vulgaris, Fab.	Cockchafer.
	Agriotes obscurus, L.	Wireworms.
	Ophonus pubescens, L.	Strawberry Seed Beetle.
	Thrips sp.	Thrips.
	Capitophorus fragariae, Theob.	Strawberry Aphis.
	Macrosiphum gei, Koch.	Geum Aphis.
	Cidaria truncata, L.	Common Marbled Carpet Moth.
	Plusia gamma, L.	Silver Y Moth.
	Acromycta rumicis, L.	Knot Grass Moth.
	Hepialus lupulinus, Linn.	Garden Swift Moth.
	Agrotis spp.	Cutworms.
	Tipula spp.	Leatherjackets.
	Cladius pectinicornis, Fourc.	Strawberry Sawfly.
	Tetranychus telarius, Linn.	Red Spider.
	Tarsonemus fragariae, Zinim.	Strawberry Mite.
	Aphelenchoides fragariae, Ritz. Bos.	Strawberry Elworm.
	Blanjulus pulchellus, Leach.	Millipedes.
	Helix rufescens, Penn.	Strawberry Snail.
	FLOWERS.	
Narcissus.	*Melolontha vulgaris*, F.	Cockchafer.
	Merodon equestris, Fab.	Large Bulb Fly.
	Rumerus tuberculatus, Rond. and *strigatus*, Flu.	Lesser Bulb Flies.
	Rhizoglyphus echinopus, Fum. and Rob.	Bulb Mite.
	Tarsonemus approximatus, var. *narcissi*.	Bulb Scale Mite.
	Anguillulina dipsaci, Kuhn.	Bulb Eelworm.
	Anguillulina pratensis, de Man.	Root Eelworm.
	Arion hortensis, L.	Garden Slug.
	Agriolimax agrestris, L.	Grey Field Slug.
Tulip.	*Myzus circumflexus*, Buckt.	Greenhouse Aphis.
	Anuraphis tulipae, B. de Fonsc.	Tulip Aphis.
	Macrosiphum gei, Koch.	Geum Aphis.
	Myzus persicae, Sulz.	Potato and Peach Aphis.
	Rhizoglyphus echinopus, Fum. and Rob.	Bulb Mite.
	Arion hortensis, L.	Garden Slug.

Crops.	Pest.	English Name.
Iris.	*Eumerus tuberculatus*, Rond.	Lesser Bulb Fly.
	Merodon equestris, Fab.	Large Bulb Fly.
	Isopoda.	Woodlice.
Gladiolus.	*Myzus persicae*, Sulz.	Potato and Peach Aphis.
Anemone.	*Sminthurus viridis*, L.	Springtails.
	Agriotes spp.	Wireworms.
	Meloe violaceus, Marsh.	Oil Beetle.
	Myzus circumflexus, Buckt.	Greenhouse Aphis.
	Myzus ornatus, Laing.	Violet Aphis.
	Agrotis spp.	Cutworms.
	Phlogophora meticulosa, L.	Angle Shades Moth.
Chrysanthemum.	*Forficula auricularia*, L.	Earwigs.
	Otiorrhynchus sulcatus, L.	Vine Weevil.
	Lygus pratensis, Fab.	Tarnished Plant Bug.
	Macrosiphoniella sanborni, Gill.	Chrysanthemum Aphis.
	Aphis helichrysi, Kalt.	Chrysanthemum Aphis.
	Agrotis spp.	Cutworms.
	Psila nigricornis, Meig.	Chrysanthemum Root Fly
	Phytomyza sp.	Chrysanthemum Leaf Miner.
	Aphelenchoides ritzemabosi, Schw.	Chrysanthemum Eelworm.
Violet.	*Agriotes spp.*	Wireworms.
	Myzus ornatus, Laing.	Violet Aphis.
	Agrotis spp.	Cutworms.
	Tipula spp.	Leatherjackets.
	Dasyneura affinis, Kieff.	Violet Leaf Curling Midge.
	Tetranychus telarius, L.	Red Spider.
	Apelenchoides olesistus, Ritz Bos.	Violet Eelworm.
	Arion hortensis, L.	Garden Slug.
	Agriolimax agrestris, L.	Grey Field Slug.
Polythanus.	*Tetranychus telarius*, L.	Red Spider.
Salvia.	*Eupteryx mellisae*, Curt.	Leaf Hopper.
Cyclamen.	*Otiorrhynchus sulcatus*, L.	Vine Weevil.
	Thrips sp.	Thrips.
	Heterodera marioni, Goodey.	Root Knot Eelworm.

Crops.	Pest.	English Name.
Carnation.	*Tortrix pronubana*, Hb.	Carnation Moth.
	Hylemyia nigrescens, Rod.	Carnation Root Fly.
	Tetranychus telarius, L.	Red Spider.
Sweet William.	*Anguillulina dipsaci*, Kuhn.	Bulb Eelworm.
Arum.	*Myzus persicae*, Sulz.	Potato and Peach Aphis.
	Myzus circumflexus, Buckt.	Greenhouse Aphis.
	Tetranychus telarius, L.	Red Spider.
Wallflower.	*Chortophila brassicae*, Bche.	Cabbage Root Fly.
Stock.	*Psylliodes chysocephala*, Linn.	Cabbage Stem Flea Beetle.
	Chortophila brassicae, Bche.	Cabbage Root Fly.
Calendula.	*Hadena oleracea*, L.	Tomato Moth.
Primula Cineraria.	*Otiorrhynchus sulcatus*, L.	Vine Weevil.
	Tetranychus telarius, L.	Red Spider.
Pelargonium.	*Myzus persicae*, Sulz.	Potato and Peach Aphis.
	Myzus pelargonii, Kalt.	Pelargonium Aphis.
Fuchsia.	*Myzus duffieldii*, Theo.	Fuchsia Aphis.
	Trialeurodes vaporariorum, Westw.	Greenhouse White Fly.
Sweet Pea.	*Blatta orientalis*, L.	Cockroach.
Canna.	*Myzus circumflexus*, Buckt.	Greenhouse Aphis.
	Tetranychus telarius, L.	Red Spider.
Azalea.	*Gracilaria azaleella*, Brants.	Azalea Leaf Miner.
Magnolia.	*Dactylopius citri*, Rioso.	Mealy Bug.
Rose.	*Capitophorus tetrarhodus*, Wlk.	Rose Aphis.
	Macrosiphum rosae, L.	Rose Aphis.
	Auclaspis rosae, Bore.	Rose Scale.
Acacia.	*Icerya perchasi*, Mask.	Fluted Scale.
Rhododendron.	*Leptobyrsa rhodondedri*, Horv.	Rhododendron Bug.

MISCELLENEOUS.

Crop.	Pest.	English Name.
Austrian Pine.	*Lophyrus rufus*, Kl.	Pine Sawfly.
Euonymus.	*Abraxas grossulariata*, Linn.	Magpie Moth.
Bamboo.	*Myzocallis arundicoleus*, Clarke.	Bamboo Aphis.
Douglas Fir.	*Chermes cooleyi*, Gill.	Douglas Fir Chermes (Aphis).
Silver Fir.	*Pineus stroli*, Hgt.	Silver Fir Aphis.
Hibiscus.	*Ripersia sp.*	(Scale).
Buddleia.	*Cionus scrophulariae*, L.	(Weevil).
Oak.	*Tortrix viridana*, L.	Green Oak Tortrix Moth.
	Cossus ligniperda, F.	Goat Moth.
Castor Oil Plant.	*Lictensia viburni*, Sig.	(Scale).
Willow.	*Phyllodecta vitellinae.*	Willow Beetle.
	Phyllodecta vulgatissima.	Willow Beetle.
	Cavariella capreae, F.	Willow and Carrot Aphis.
	Aphis saliceti, Kalt.	Willow Aphis.
	Pachys betularia, L.	Peppered Moth.
	Rhabdophaga heterobia.	" Button Top " Midge.
Mushroom.	*Collembola.*	Springtails.
	Sciara spp.	Fungus Gnats.
	Tyroglyphus mycophagus, Megnin.	Mushroom Mite.

Anemone Pests and Diseases

1.—PESTS

Fortunately, anemones have not shown themselves to be particularly susceptible to attacks by insect pests, though it is probably too much to hope that this state of affairs will continue. The list of pests which have caused damage to anemones in Devon and Cornwall consists of the following: Wireworms, Cutworms, Angle Shades Moth, Aphids, Springtails, and Oil Beetles.

WIREWORMS

Since anemones undoubtedly do exceptionally well on newly broken grassland, growers are quick to seize any opportunity of growing them under these conditions. Before deciding to grow anemones on a piece of newly broken land it is advisable to examine the soil carefully for traces of wireworm. If any appreciable numbers are found the wisest course is probably to grow the crop elsewhere. In the meantime a crop of mustard ploughed in green will do much to make the land suitable for the crop in the following season. Wireworms will feed on practically any crop except mustard and the growing of this crop will reduce the number of wireworms considerably, largely by starvation.

CUTWORMS

Cutworms are the dull brown or grey caterpillars of a number of kinds of moths. The three species which are most common are the Turnip Moth (*Agrotis segetum*), the Yellow Underwing Moth (*Tryphaena pronuba*) and the Heart and Dart Moth (*Agrotis exclamationis*). Cutworms feed largely at night and bite through the leaf and flower stems of the anemones at ground level. Cutworms have frequently been found to be the cause of serious losses. The moths are to be found during June and July and eggs are laid on a great variety of plants near to soil level. The majority of the caterpillars which hatch from these eggs feed throughout the autumn and winter, changing to pupae in the soil in the following spring, the moths emerging in June.

Cutworms are especially to be watched for in newly broken grass land, or in land which has been allowed to become foul with weeds. Land should be broken as early as possible, preferably in early summer, as by this means attacks may often be avoided.

The most effective method of control is by means of a poison bait consisting of a mixture of damp bran and Paris Green. Paris Green is poisonous and must be handled with care. The poison bait is made as follows: 20lbs. of dry broad bran is thoroughly mixed with 1lb. of Paris Green. In this condition the bait may be stored in tins so as to be handy for use when required. Before actual use the bait requires to be damped. In 1 gallon of water dissolve ½ pint of molasses or coarse treacle and add the mixture carefully to the bran and Paris Green, stirring thoroughly. Continue to add this solution to the bran until the bait is thoroughly damp, but still of a crumbly consistency, so that it may readily be broadcast. The addition of the treacle increases the attraction of the bait considerably. The above proportions give a sufficient supply of the bait with which to treat one acre of ground, at a cost of about 6 shillings.

The bait is most effective if applied just before dusk. Two or more applications may be required where the attack is severe. The poison bait is also effective against leather-jackets, millipedes and slugs.

ANGLE SHADES MOTH (*Phlogophora meticulosa*)

The caterpillars of this moth have recently caused much concern amongst anemone growers in Devon and Cornwall; the caterpillars feed on the flowers and render them quite unfit for market.

The moths appear in May and June, and a second generation is to be found in September. The colour of the moth is a light pinkish-brown, banded with dark olive green.

The caterpillars vary considerably in colour and range in tint from apple green to olive brown. The surface of the body is densely sprinkled with small, and rather obscure, whitish dots. There is a very narrow white line running along the back and broader and less obvious lines are to be found along the sides. The caterpillars have been found feeding on groundsel, primrose, dock, bracken, chrysanthemum, geranium, broom and many other herbaceous plants.

The caterpillars may be found to some extent practically all the year round, but appear to be most common from July to the end of September. Some of the caterpillars may be found feeding throughout the winter.

When the caterpillars are fully fed, they spin a web on the ground, or among the stones on a rough wall, and inside this web change to pupae. The majority of the caterpillars pupate in April or May.

Unfortunately the caterpillars seldom make their appearance in sufficient numbers to cause serious damage until after the flowering period has commenced. The damage to flowers would seem to be largely caused by the caterpillars of the second generation, which hatch from eggs laid by moths emerging in September. It is probable that the earlier generation of caterpillars lives largely on weeds and other plants. It has not yet been possible to carry out any experiments in control, but several suggestions can be made. The practice of leaving, or picking and throwing down, any blooms containing caterpillars is to be deprecated, since these caterpillars will soon leave the affected blooms and transfer their attentions to others. Affected blooms should be collected and destroyed and in this way there is little doubt that large numbers of the caterpillars would be accounted for. Where the attack is so severe that the majority of the flowers are showing damage it would probably be well worth while to carry out a thorough spraying with lead arsenate, at the usual rate of 5lbs. lead arsenate paste to 100 gallons of water, with the addition of an efficient spreader. Contact sprays would be unlikely to give good results since the caterpillars are usually to be found inside the flowers and would be difficult to hit directly with a spray, for which reason a stomach poison such as lead arsenate is suggested. Weeds present among the anemones should also be sprayed.

OIL BEETLES. (*Meloe violaceous*, Marsh).

During the year 1928, Hodson recorded the destruction of anemone buds over a considerable acreage in S. Devon by the Oil Beetle (*Meloe violaceous*). This is not a pest of common occurrence but it is worthy of mention. The beetle is a dark metallic blue in colour, with a soft swollen body and short wing cases. The length of the beetle is a little more than 1 inch. A large portion of the life cycle of these insects is passed in the nests of bees.

APHIDS.

Aphids, or Greenfly, of one kind or another are usually to be found in the list of pests of most plants and anemones are no exception. A common and cosmopolitan species often called the Greenhouse Aphis (*Myzus circumflexus*) has been found attacking anemone flowers, but the chief offender amongst the Aphids is clearly the Violet Aphis, which has caused much consternation amongst violet growers during the past few years. A full account of this pest, as it affects violets, will be found in the Ninth and Tenth Annual Reports of this Department.

The aphids feed largely in the flowers; by sucking the sap from the petals the aphids retard their development, thus leading

to the production of deformed flowers. A large number of aphids on the petals of the flowers also renders them unsightly, particularly in the case of the dark coloured blooms.

The Violet Aphis (*Myzus ornatus*) is a small green species ornamented on the back by a number of small, dark brown, spots and streaks, thus rendering it easily recognised. In addition to feeding on anemone and violets this aphid is common on Buttercups and Hedge Mustard ; for this reason these two weeds should be kept in check as much as possible. Violets must be regarded as a source of infection for anemones and *vice versa*.

Spraying the affected anemones with a contact insecticide would seem to be the only method of control, but this presents many difficulties, chief of which is the situation of many of the insects within the flowers, where they cannot be easily reached with a spray. Observations have shown that the aphids are relatively scarce on the foliage and there does not appear to be any period when they are all on the leaves, prior to attacking the flowers. Migration presumably takes place from other plants direct to anemone flowers.

SPRINGTAILS. (*Sminthurus viridis*).

The evidence as to the importance of this insect as a pest is by no means complete. Cases have, however, been observed in Cornwall where this insect appears to have been responsible for a certain amount of injury to anemone seedlings, caused by their feeding around the base of the leaf stalks.

This trouble is most to be expected in damp, poorly drained situations.

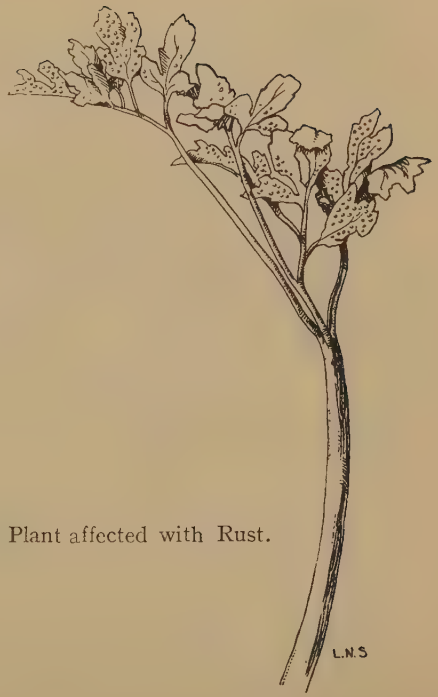
Springtails are minute insects, about 1-12th inch in length, and pale green in colour. The insects are known to occur on various grasses and cereals, root crops and on clovers, on which last crop they have been found to cause serious injury. The exact importance of Springtails as pests of anemones has yet to be determined. In the event of their becoming of first importance it is likely that dusting with an insecticide dust containing nicotine sulphate would be effective, though such measures would need to be carried out in the early part of the day, or during the evening, since Springtails are not active during the hot part of the day.

II. DISEASES.

The list of fungi attacking *Anemone coronaria* is not a long one and references in the standard textbooks are rare. There is only one disease known to be caused by fungi which is common in Devon and Cornwall. This is the Anemone and Plum Rust, *Puccinia Pruni-spinosae*.

(Another rust (*Ochropsora sorbi*) has been recorded on *A. fulgens* in the Isles of Scilly, but the record has since proved to be erroneous).

Leaf of a normal Anemone Plant.



Leaf of Anemone Plant affected with Rust.

Anemone Plant affected with "Winter Browning" Disease.

This fungus does no significant damage and growers do not trouble about it. They apply the term " Rust " to a very different trouble of uncertain nature, which has caused serious losses in Cornwall in the last few years. It is described below in Section III.

Plants affected with the true fungal Rust are easily recognised (see illustrations). The leaves are malformed and thickened and much less divided than a normal leaf. The stalks are thicker and taller. The cluster cups bearing the spores are formed all over the lower surface of the leaf. These spores will infect the leaves of Plum trees but not Anemones. Plum Rust is very common in Devon and Cornwall from July onwards but its amount does not seem to show any relation to the distance from anemones. Rust from Plums may become transferred to Anemones in the Spring and Anemone Rust is observed first in March and is not common till May. As the corms are not saved but are purchased afresh from Holland no loss is suffered, but if it was intended to save the corms, the rusted plants should be rogued out as they will never flower again, but will reproduce the disease each season from the mycelium perennial in the corms.

Rust is common throughout Europe and has also been found on *Anemone nemorosa, ranunculoides* and *fulgens*, but not on *A. japonica*.

III. ANEMONE " RUST " OR BROWNING

The growers of West Cornwall apply the term " Rust " to a trouble of rather indefinite nature which has proved very destructive in recent seasons. It was first observed by the writers in February, 1926 but it was rare till 1930 and little significance was attached to it until 1932, when its occurrence became more widespread and more serious. The disease occurs now all over Cornwall and in North Devon and is probably present in Scilly where it is attributed to damage from sea spray.

The trouble is most commonly observed in the winter in January and February, so that we have adopted the provisional name of " Winter Browning " for it. As however severe cases have occured in the autumn as early as September the name is not a good one.

The symptoms are variable and difficult to describe in precise terms. Many or all of the following symptoms may be found in any given field showing the disease, but it is not certain which are the essential symptoms of the disease and which may be accidentally associated with it.

1. Roots.

The roots are decayed and brown and disintegrate into the soil so that when the plant is dug up the root system is seen to be

much smaller than that of a normal plant and in extreme cases may be completely absent. Fungal threads are always present in the decayed roots but not abundantly as a rule. Several fungi have been isolated.

2. Corms.

The corms are not affected, generally remaining perfectly healthy. Occasionally the corm rots away in bad cases when all the shoot and the roots are decayed.

3. Leaves.

There are two types of initial symptoms (*a*), purplish tint to the leaf with no decay, (*b*) brown decay of the leaf margin. It is not certain how far either is really part of the disease and it would be hard to find a plantation in the autumn or winter entirely free from either symptom. Later the whole plant may become pale or yellowish and the brown decay may extend. The leaf stalk also often decays very rapidly, though the decay semes to be generally seated at the base. Abundant fungi and bacteria are found in these leaf bases. The stalks of leaves not yet unfolded generally remain healthy.

4. Flowers.

The flower crop is seriously reduced. Flowers already formed are small and brown at the edges and the stalk often decays in the same way as the leaf stalk.

The resultant effect on the field is to form large brown patches and frequently the whole field goes brown. Recovery is always possible in fine dry weather and usually happens in March and April, although it is often too late to be of much commercial value.

It has always been observed that plants raised from seed are more resistant than those raised from corms and, in fact, the losses to the former are usually so small as to be unimportant. No evidence has ever been found, however, of the presence of any disease in the corms.

We must now turn to the possible theories of the cause of this Anemone trouble. They may be listed as follows :—

1. Root Rot (Fungus decay of the roots).
2. Fungus decay of the Leaf Stalks.
3. Secondary effects of Insect Pests.
4. Secondary Effects of Weather Damage.
5. Secondary Effects of Damage from Cultivation.
6. Eelworm
7. Waterlogging.
8. Soil Deficiencies.

1. Root Rot seems a likely cause and is being investigated in detail. No single fungus has been found to prevail, however, so that Root Rot may not be the primary cause.

2. Leaf Stalk Fungi. The same objections apply as to Root Rot.

3. Insect Pests. A good deal of damage can be traced to Wireworm or Cutworm but not sufficient to account for bad cases of the disease.

4. Weather Damage. This theory has been much favoured but with wider experience of the disease the close correlation with the weather that was expected has not been found. Quite bad cases may occur in good weather early in the autumn and the disease is often very irregular in its distributiou in the same district.

5. Damage From Cultivation. It is bad to cultivate anemones after flowering has begun and the roots must never be disturbed. Careless hoeing or weeding can therefore do a lot of harm. If a plant is partly uprooted in this way it is more likely to wither and die than to secure itself in the soil again. This is a very common cause of unsatisfactory patches in plantations but there is no evidence that it causes the present disease.

6. Eelworm. Saprophytic eelworms are common, but no parasitic species, such as the Bulb Eelworm, have been found.

7. Waterlogging. Bad drainage is undoubtedly unfavourable to anemones. When the ground gets trodden in wet weather healthy root action is obviously more difficult and it is to be expected that fields will cease to flower much, after say, a wet February. The typical Anemone trouble occurs however in satisfactorily drained fields as well as in wet ones, so that waterlogging cannot be the whole explanation.

8. Soil Deficiencies. The ideal soil for anemones is a fertile loam, but the plant will grow in a great variety of soils. In order to throw light on this aspect of the problem, a great many soil samples have been collected and analysed by the Advisory Chemist. Before these can be summarised it is necessary to explain what is meant by the available nitrogen, potash and phosphates of the soil The plant takes up nitrogen in the form of nitrates from the soil. The latter are obtained either directly or through the activities of soil organisms. The amount available will depend chiefly on the latter, and also on the amount of loss by leaching, due to rain. The amount always falls off as winter approaches, because the lower temperature reduces bacterial action and the higher rainfall causes greater leaching. For the anemone plant to go on growing actively through the winter as is desired by the grower, some method of reducing this fall in nitrogen level is required. Unfortunately this cannot be done in practice, except to

some extent by adding organic matter to the soil, but mostly the the grower is dependent on the type of his soil available.

The potash level is not so variable with the season and can be corrected by applications of sulphate of potash. It varies with the type of soil, but the majority of soils in Devon and Cornwall tend to be deficient in potash. It is a general rule, although the exact explanation is not understood, that plants grow more healthily when adequately supplied with potash.

Phosphates resemble potash in their relative constancy during the season but they are still less easuly removed by rain and tend to accumulate in soils which are well cultivated or are heavily manured.

Fertile soils are found on analysis to be higher in nitrogen and potash than less fertile ones and the phosphates are present in adequate amount but not in excess. They approximate fairly closely to the following imaginary analysis :—

Hydrogen on concentration,	6.4.
Organic matter,	12.5 per cent.
Available Potash,	.036 per cent.
Available Phosphate,	.032 per cent.
Available Nitrogen,	15.0 parts per million.

The more the results of the analysis depart from the above, especially if in an unbalanced manner, i.e., if one substance is in excess and another below the ideal amount, the more unsatisfactory are the crops growing on that soil.

The following table gives the analyses of soils in different anemone fields, samples being taken from the good patches as well as the bad ones. In each pair the first sample is from the better patch. It will be seen that the deficiency of potash in proportion to the amount of phosphates is always greater in the worse patch.

Sample Number	Date.	pH.	Organic Matter p.c.	Available Phosphates. p.c.	Exchangeable Potash p.c.	Nitrogen p.p.m.
3391	8 Dec., 1933	7.80	12.45	.045	.024	3.1
3393	,,	7.89	11.96	.044	.009	5.7
3438	27 Jan., 1934	7.51	7.32	.141	.034	10.0
3439	,,	7.51	8.98	.276	.036	11.4
3436	27 Jan., 1934	5.79	8.22	.045	.024	19.4
3437	,,	5.78	7.79	.047	.018	11.8
3795	12 Oct., 1934	6.38		.030	.037	
3796	,,	5.40		.038	.033	

The next table gives typical examples of soils in which anemones have failed. It will be seen that the majority show a large excess of phosphates. Some do not, however, so that this phosphate excess is not the only cause.

Sample Number	Date.	pH.	Organic Matter p.c.	Available Phosphates p.c.	Exchangeable Potash p.c.	Nitrogen p.p.m.
2207	24 Aug., 1932	7.39	5.53	.440	.020	21.1
2471	23 Jan. 1933	7.16	9.29	.349	.026	15.4
2661	17 Mar., 1933	6.61	7.21	.262	.038	13.6
3406	8 Jan., 1934	7.55	—	.122	.042	—
3409	,,	7.59	—	.020	.048	—
3441	27 Jan., 1934	5.62	10.03	.021	.026	13.7
3454	29 Jan., 1934	7.36	—	.219	.012	—
3797	12 Oct., 1934	5.62	—	.022	.029	—

The final table shows the analyses of soils from where anemones have done well. It will be seen that they are very various, but phosphates are not in marked excess, i.e., they are fairly well balanced soils. It should be observed they are all heavy loams or well treated lighter soils.

Sample Number	Date.	pH.	Organic Matter p.c.	Available Phosphates p.c.	Exchangeable Potash p.c.	Nitrogen p.p.m.
2909	26 June, 1933	8.55	8.17	.036	.014	8.1
2910	,,	8.51	8.21	.041	.021	8.0
3436	27 Jan., 1934	5.79	8.22	.045	.024	19.4
3455	29 Jan., 1934	7.73	—	.005	.022	—

Suggested Control Measures.

The above discussion of the present state of the anemone problem allows us to formulate the following measures for control or rather, prevention, of the trouble. This is not, of course, complete, but is probably sound as far as it goes.

1. Thorough cleaning and preparation of the ground before planting.
2. Adequate potash and organic matter in the preliminary manuring.
3. Good drainage (raised beds if necessary).
4. Grow plants from seed rather than corms if possible.
5. Care in cultivation so as to avoid disturbance of the roots.

Notes on Fungal Diseases during the Year.

Except for showery weather in March and April, the year was very dry until the end of July; afterwards there was a good deal of rain in August and September.

Rainfall at Seale-Hayne College, 1934.

February	0.12 in.	June	1.82 in.
March	2.98 in.	July	2.00 in.
April	3.10 in.	August	3.01 in.
May	1.08 in.	September	3.08 in.

The rain in March and April favoured Tulip Fire and in August and September it favoured Blight and late attacks of Apple Scab. The dry May was very much against Scab, however, and little was seen before August, so that on the whole, Scab was very much below normal. The weather of June and July was drier than the figures indicate, as three-quarters of the total rain fell on two days in June and on one day in July.

CEREALS. No grain diseases were observed except small amounts of Wheat Loose Smut, Oats Loose Smut, and Barley Leaf Stripe and Covered Smut in Cornwall. In the Spring there was one bad case of Leaf Spot of Oats (*Helminthosporium Avenae*) in Cornwall; the affected parts of the field were markedly deficient in potash. In some parts of Devon the oats were backward, but no disease was found and the crop recovered later.

POTATOES. Blight was very scarce in 1934 until the end of August. Isolated outbreaks were observed at Crowlas, near Penzance on May 16th, and in a garden at Braunton on July 9th (variety Catriona). The damage done was small, and the disease did not spread. Generally in West Cornwall the crops were lifted perfectly healthy.

On the main crop varieties, Blight began at the end of August in both Devon and Cornwall. It was first observed, on August 16th at Seale-Hayne College on Majestic, on King Edward on August 12th at Bridford, and on August 23rd near Truro on Up-to-Date. Progress was very slow until the last week in August, but most damage was done in September and the wet autumn resulted in a large amount of tuber decay in most areas.

Dry Rot was very troublesome on the seed of early varieties in South Devon. Other diseases were normal except Streak which was remarkably widespread and abundant in August, some fields

being so badly decayed as to look like a blight epidemic in the distance. The disease did not appear until considerable growth had been made so that it probably did not affect the crop very much. No doubt it was favoured by the dry early summer.

Secondary growth and tuber splitting were common in many varieties.

Root Crops. Mangold Black-Leg was practically non-existent and Rust was slight, except for one fairly severe case in South Cornwall, in which the field was extremely deficient in potash. One case of Dry Rot was observed in South Devon in which about half-an-acre was very badly affected. As the soil was short of lime, the full amount to correct the deficiency (2½ tons burnt lime) was applied in December. This large dressing combined with the dry early summer is considered to have produced the disease. The fungus *Phoma Betae* was not found.

Finger-and-Toe was below normal and the only other disease recorded was Dry Rot in Swedes in North Devon.

Beans. Chocolate Spot was not observed.

Vegetables. The sclerotial disease (*Sclerotinia sclerotiorum*) attacked the Jerusalem Artichoke both in the store and in the ground at Kingsbridge during the winter.

Rust was observed on both Garden Beet and Spinach Beet, but did no damage.

Broccoli diseases were below normal. Downy Mildew was frequent but never serious, except on an Angers variety in East Devon: it was also found on Cabbage seedlings. Ring Spot and Soft Rot were below normal.

Ring Spot is still the most important Lettuce disease, but Grey Mould and Downy Mildew were also serious. Ring Spot was also observed on Endive in Cornwall and Leaf Spot (*Pleospora herbarum*) was found on Endive in Cornwall and on Lettuce in Devon. Bacterial Spot was not observed.

No diseases were observed on Onions or Peas.

Tomato diseases were generally below normal. Leaf Mould was later than usual, and spraying was widely carried out with satisfaction. Spotted Wilt was still more widely distributed and is becoming a serious disease to the small grower. Diseased plants in pots were introduced into the experimental greenhouse planted with Kondine Red Tomatoes at Seale-Hayne College. About a fortnight after they had been removed, one of the greenhouse plants showed the early symptoms of the disease in the upper leaves. These were cut off four days later, leaving only healthy leaves, and although this plant did not grow (there being no lateral buds), there was no further sign of the disease in the house.

Fruit. Apple Scab was below normal during the summer, being very scarce on the leaves. It was observed in Cornwall in the middle of June and in Devon early in July, and in all cases was worst on trees in poor condition owing to Leaf Scorch or other causes. Where trees were doing well, Scab was often scarce even with little or no spraying. Scab increased on the fruit in August but was below normal. Perithecia on decayed leaves in the spring were abundant on some leaves and scarce on others. All the ascospores seen were immature, even as late as May 9th. Apple Mildew was scarce and Canker was much less frequent than in the last few years. Blossom Wilt on the other hand, was as common as in 1933, but Brown Rot was equally scarce as in last year.

The Pear crop was unusually clean, but losses in store were troublesome in spite of very careful handling. Soft Rot (*Penicillium expansum*) spoiled many pears at Exeter and Canker (*Nectria galligena*, conidial stage) at Topsham.

Plum Rust was common as usual, but no other plum diseases were observed, except Silver Leaf.

American Gooseberry Mildew was again below normal: it began in South Devon on May 19th. It was fairly severe in unsprayed gardens. One case of Silver Leaf on Gooseberry was observed.

Black Currant Leaf Spot was plentiful in August and September. One case of Rust was observed.

Raspberries and Loganberries were very free from fungal diseases. Cane Spot (*Elsonie veneta*) was observed on the Black-, berry.

Like last season, Strawberries escaped fungal diseases, and suffered more from the drought. Mildew appeared on Bedford Champion in North Devon on June 16th, and on Royal Sovereign in South Devon on June 30th.

Flowers. Foliage diseases of Narcissus, though common, did generally little damage. Grey Mould (*Botrytis narcissicola*) was bad in favourable localities in February and March on trumpet varieties, especially Golden Spur. White Mould (*Ramularia Vallisumbrosae*) appeared in West Cornwall on February 26th, and in Tamar Valley on March 23rd, but did very little damage. Flower Spot (*Stagonospora* and *Botrytis*) was troublesome occasionally, but the total damage was not large. Satisfactory control was claimed in the variety Horace at Penzance by spraying with a proprietary copper spray just before the flower buds emerged from the spathe. Stripe was frequent but did no damage. Rootplate Rot was common, and a very severe case of Root Rot was observed in Devon, in which a soil analysis showed arsenic was present in about 25 times the normal amount and the soil was excessively overbalanced with phosphates. *Cylindrocarpon radicicola* was readily isolated from

a large number of roots. These observations confirm previous ones in indicating that the fungus is a weak parasite doing damage only in adverse soil conditions.

Tulip Fire was much commoner than last year. West Cornwall crops escaped serious damage although there was a certain amount of flower spot on all varieties. The disease was very troublesome in Devon and other parts of Cornwall owing to the cold and showery weather in April. In all districts, beds not newly planted were completely spoiled. The varieties Bartigon, William Copeland and Sieraad van Flora showed very high susceptibility, and in many cases, served as a reservoir for the disease from which other varieties became affected though to a less extent. Too close planting of bulbs in the beds very greatly helped the spread of Fire and rows are to be preferred to the bed system if space is available.

Iris Ink Spot disease was very common and widely distributed: it was first observed in Penzance on January 29th. The much more serious Leaf Spot (*Heterosporium gracile*) was less common and although bad cases occurred, the incidence of the disease was below normal. Bad cases of Stripe were observed in the varieties Wedgwood, Everdingen and Poggenbeck.

Anemones were again troubled by "Winter brown" though it was generally less severe than last season. As before, all the soils analysed showed excess available phosphates. (See page 33.)

Gladioli were much affected by the dry weather, which probably greatly increased the losses from Dry Rot as well as inducing early leaf decay even where diseases were absent.

Fairy Ring was very troublesome on Carnations in South Devon in the late summer, which turned cold and wet. Leaf Spot (*Phyllosticta Richardiae*) on Arums was completely controlled under glass by keeping the atmosphere dry.

Chrysanthemum Rust was unusually severe in the autumn of 1933. In some nurseries it was described as being the worst season for thirty years. Varieties badly attacked included Friendly Rival and Ethel Thorpe. The disease was much less severe in 1934, when its incidence was about normal. Hollyhock Rust was abundant in gardens and Sweet William Rust was also very frequent. Snapdragon Rust has undoubedly come to stay. It was abundant in gardens in Devon, being observed early in August so that the later flowering of this plant was completely spoiled. It was also found in Cornwall at Penzance. (See page 42.)

MISCELLANEOUS. *Armillaria mellea* was found doing considerable damage to Rhubarb on a field scale near Penzance, and in a garden in S.E. Cornwall. In each case the site was formerly an orchard. The fungus was also observed on Apple, Gooseberry, Nectarine, Fig, Cherry, Vine, Plum, Lilac, Viburnum Laurestinus and Genista.

Potato Blight and the Weather.

As in previous years, the incidence of Blight in plots at Seale-Hayne College has been carefully observed in relation to the weather. The variety grown was Majestic, Scotch seed. The seed was planted April 25th to 27th, and the shoots began to come through on May 14th. Flowers appeared and many fruits were formed in July before Blight began. No disease was observed until August 16th, and the spread was very slow at first. There was a big increase on the 25th, but then little change followed until September, when the disease became universal, and the fruits were attacked as well as all the leaves. Rainy weather during lifting in September and October resulted in considerable tuber infection.

If we examine the weather preceding the outbreak, we find that May, June and July were generally dry, conditions being anticyclonic. Relative Humidity over 75 per cent all day occurred on the following dates:—

May 6th, 10th, 21st.
June 21st, 24th, 26th.
August 5th, 7th, 10th, 11th, 12th, 24th, 28th.

so that the conditions were very unfavourable to Blight. If we apply the rule requiring a two day period of high humidity to precede the outbreak of Blight we find August 10th-12th is the first critical date of the outbreak.

In previous reports, conditions obeying the following rules were also found to herald a Blight outbreak.

1. Dew observed either the night before or in the morning.
2. Minimum temperature 50 deg. F. or above.
3. Sunshine less than 5 hours.
4. Rainfall at least 0.01 inch.
5. Relative Humidity at 3 p.m. not less than 75 %

The dates on which the above conditions were fulfilled in 1934 at Seale-Hayne College are set out in the following table:—

Month.	Rule	Days.
May	1	1, 2, 3, 7, 9, 10, 11, 12, 20, 25, 27, 30.
	2	12, 22, 31.
	3	3, 6, 10, 19, 20, 21, 22.
	4	4, 5, 6, 8, 15, 19, 31.
	5	6, 10, 19, 21, 22.

Month.	Rule.	Days.
June	1	1, 7, 11, 15, 16, 23, 29.
	2	1, 2, 5, 11, 12, 14, 15 to 30.
	3	8, 9, 13, 14, 15, 19, 21, 23.
	4	1, 5, 18, 21, 22, 23, 24, 25, 26, 27.
	5	21, 23, 24, 26.
July	1	1, 3, 4, 5, 16, 17, 18, 19, 20.
	2	1 to 31.
	3	12, 15, 16, 20, 24, 25, 27, 29, 30.
	4	10, 12, 13, 17, 20, 21, 22, 24, 30.
	5	11, 14, 17, 22, 26.
August	1	8, 9, 14, 15, 16, 17, 18, 19, 20, 24, 25, 26.
	2	1, 2, 3, 5 to 14, 16, 17, 19, 21, 28.
	3	1 5, 7, 9, 10, 12, 16, 28.
	4	1, 4, 5, 7, 10, 12, 19, 21, 22, 23, 24, 27 to 31.
	5	1, 5, 6, 7, 8, 10, 12, 21, 22, 24, 28.
September	1	6, 10 to 16, 25.
	2	3, 4, 6 to 9, 11, 13 to 17, 19 to 22, 26, 28, to 30.
	3	2, 8, 15 to 30.
	4	1, 2, 4, 6, 16 to 24, 26 to 30.
	5	2, 6, 8, 10, 18, 19, 20, 22, 26 to 30.

An examination of the above shows that the only critical date is June 23rd, i.e., conforming to every rule. If we take dates obeying four rules we get June 21, 23 ; July 17, 20 ; August 1, 5, 7, 10, 12, 28 ; September 6, 16, 19, 20, 22, 26, 28, 29, 30.

This method gives less satisfactory results than the humidity method, and for practical purposes the latter is regarded as much the more useful, whether afternoon or continuous readings are adopted. Considering rule 5 alone, evidently possible Blight inception periods are May 19-22, June 23-26, August 5-12, and 21-28, September 18-26 and 26-30. Hot dry weather in the interval neutralised the effects of the May and June periods, but the rest were closely followed by active Blight stages. The continuous hygrometer records are also in agreement with this.

Reviewing the season as a whole, the epidemic was an unusually late one, and was not fully developed until the second half of September. The humidity data explain this as in previous years. The number of days of high humidity was less even than in 1933, and much less than in the bad year of 1931.

	1934	1933	1931
May	3	7	14
June	3	2	14
July	0	6	15
August	7	1	16

The next table gives the average afternoon humidity for each month.

	1934	1933	1931
May	60.4%	67.7%	74.7%
June	58.7	67.4	76.6
July	61.2	67.7	76.4
August	70.0	62.5	74.5
September	74.5	67.7	74

1934 was even drier than 1933, except in August and September, in which months Blight was more severe in 1934 than in 1933.

Conditions in West Cornwall were nearly as dry as in Devon. The afternoon humidity at Gulval was high on April 16 to 19, 23 to 26 and 28, but May was dry, the only humid period being May 21, 22, 23. The local outbreak reported on May 16th was a few miles away from Gulval, but was presunably related to the humid period at the end of April. The dry May prevented any epidemic, and the crops lifted throughout the area were exceptionally free from disease.

Considering the year as a whole, conditions were not favourable for Blight epidemics in any part of the South-West until September. Had it not been for the wet September, 1934 would have been a record year for freedom from Blight, as it was in the East of England.

Snapdragon Rust.

The very serious Rust disease of Snapdragons was unknown in Devon and Cornwall before 1933. In that year it appeared apparently for the first time all over the South of England, but enquiries have since shown that isolated outbreaks may have occurred in previous warm years, although not officially reported. Whatever the origin of the disease, there is no doubt that it started on an epidemic scale only in 1933, and the epidemic was repeated on an even larger scale in 1934, and there is little reason to doubt but that it will appear again in subsequent seasons.

In Devon in 1933, the disease appeared in October, and assumed epidemic proportions in Newton Abbot and Torquay. In 1934 it appeared earlier, at the beginning of August at the original stations and in May at Honiton. It was also observed at Bradninch, Dawlish, Colyton in Devon, and at Penzance in Cornwall. The damage done was much more severe, and in many cases the beds had to be destroyed early in September.

It is doubtful whether the disease can be controlled by spraying. Some attempt was made to check it by the use of a sulphur spray but without success: as, however, the spraying was not started until after the disease had appeared, good results could not be expected.

So far as is known, there is no alternate host susceptible to the Snapdragon Rust fungus; presumably, therefore, the disease survives on plants kept through the winter. In the mild climate of the South-West, the summer spores survive the winter readily, as is shown by the following observations. Diseased plants were transplanted in the autumn of 1933 to an isolated spot at Seale-Hayne College and kept under observation. Both winter and summer spores were seen in March 1934, and on the 4th April (when the plants were destroyed.) All the spores appeared to be quite viable, although germination was not observed. During 1934, the rust was not found on volunteer seedling plants in the same bed.

Varieties appear to differ in degree of susceptibility, although all those so far grown do not show appreciable resistance. In both seasons, at several places in Devon, the rust was most abundant and severe on the dark leaved varieties.

COMPLETE LIST OF DISEASES OF CROPS IN DEVON AND CORNWALL.

The object of the present list is to form a hand list from which the diseases attacking any given crop in Devon and Cornwall can be quickly ascertained. All the lists of previous Annual Reports are included and corrected. All the diseases have been verified personally, except those indicated by an asterisk; all the latter are given on good authority. The names are those published by the British Mycological Society in the second edition of their List of Common Names of British Plant Diseases.

The third column gives the distribution of the disease in the S.W. Diseases for which no county is mentioned have been recorded in both Devon and Cornwall.

CEREALS.

Wheat.		
Black Rust	*Puccinia graminis* Pers.	Devon.
Black Mould	*Cladosporium herbarum* (Link) Fr.	Devon.
Brown Neck	Unknown	Devon.
Brown Rust	*Puccinia triticina* Erikss.	
Bunt	*Tilletia Caries* (DC.) Tul.	
Glume Blotch	*Septoria nodorum* Berk.	Devon.
Leaf Spot	*Septoria Tritici* Desm.	
Loose Smut	*Ustilago Tritici* (Pers.) Rostr.	
Mildew	*Erysiphe graminis* DC.	Devon.
Twist	*Dilophospora Alopecuri* (Fr.) Fr.	
Whiteheads	*Ophiobolus graminis* Sacc.	
Yellow Rust	*Puccinia glumarum* (Schm.) Erikss. and Henn.	Devon.
Oats.		
Black Rust	*Puccinia graminis* Pers.	Cornwall.
Black Mould	*Cladosporium herbarum* (Link) Fr.	Devon.
Blind Florets	Non-parasitic	
Crown Rust	*Puccinia Lolii* Niels.	
Damping Off	*Pythium de Baryanum* Hesse	Devon.
Foot Rot	*Fusarium sp.*	Devon.
Leaf Spot	*Helminthosporium Avenae* Eid.	
Loose Smut	*Ustilago Avenae* (Pers.) Jens.	
Mildew	*Erysiphe graminis* DC.	

Barley.

Blind Florets	Non-parasitic	
Brown Rust	*Puccinia anomala* Rostr.	
Covered Smut	*Ustilago Hordei* (Pers.) Lagerh.	
Leaf Stripe	*Helminthosporium gramineum* Rabenh.	
Mildew	*Erysiphe graminis* DC.	Devon.

Rye.

Brown Rust	*Puccinia secalina* Grove	
Leaf Blotch	*Rhynchosporium Secalis* (Oud.) Davis	

PASTURE.

Clover.

Black Blotch	*Dothidella Trifolii* (Pers.) Bayl. Elliott and Stansf.	Devon.
Leaf Spot	*Pseudopeziza Trifolii* (Biv.-Bern.) Fuck.	
Mildew	*Erysiphe Polygoni* DC.	Devon.
*Rot	*Sclerotinia Trifoliorum* Erikss.	Devon.
Rust	*Uromyces Trifolii* (Hedw. f.) Lév.	Devon.

Cocksfoot.

Choke	*Epichloe typhina* (Fr.) Tul.	Devon.
Ergot	*Claviceps purpurea* (Fr.) Tul.	Devon.
Rust	*Uromyces Dactylidis* Otth.	Devon.

Lucerne.

Downy Mildew	*Peronospora Trifoliorum* de Bary	Devon.
Leaf Spot	*Pseudepeziza Medicaginis* (Lib.) Sacc.	Devon.

Rye Grass.

Ergot	*Claviceps purpurea* (Fr.) Tul.	Devon.
Rust	*Puccinia Lolii* Niels.	

Sainfoin.

Mildew	*Erysiphe Polygoni* DC.	Devon.
Rust	*Uromyces Onobrychidis* (Desm.) Lév.	Devon.

Trefoil.

Leaf Spot	*Pseudopeziza Medicaginis* (Lib.) Sacc.	Devon.

FORAGE CROPS.

Marrow Stem Kale.

Downy Mildew	*Peronospora parasitica* (Pers.) Tul.	Devon.
Ring Spot	*Mycosphaerella brassicicola* (Fr.) Lindau	Devon.
Stem Rot	*Phoma Lingam* (Tode) Desm.	Devon.
White Blister	*Cystopus candidus* (Pers.) de Bary	Devon.

Kohl Rabi.

Finger and Toe	*Plasmodiophora Brassicae* Woron.	Devon.

Cabbage.

Finger and Toe	*Plasmodiophora Brassicae* Woron.	
Ring Spot	*Mycosphaerella brassicicola* (Fr.) Lindau	

PULSE.

Broad and Field Beans.

Chocolate Spot	Bacterial (?)	
Leaf Spot	*Ascochyta Fabae* Speg.	
Mosaic	Virus	

Pea.

Downy Mildew	*Peronospora Viciae* (Berk.) de Bary	
Spot	*Ascochyta Pisi* Lib.	Devon.

ROOTS.

Mangold.

Black Leg	*Phoma Betae* (Oud.) Frank and *Pythium de Baryanum* Hesse	
Heart Rot	Non-parasitic	
Leaf Spot	*Phoma Betae* (Oud.) Frank	
Leaf Scorch	Parasitic	
Mosaic	Virus	Devon.
Rust	*Uromyces Betae* (Pers.) Tul.	

Sugar Beet.

Black Leg	*Phoma Betae* (Oud.) Frank and *Pythium de Baryanum* Hesse.	
Heart Rot	Non-parasitic	Devon.
Leaf Spot	*Phoma Betae* (Oud.) Frank	Devon.
Leaf Scorch	Parasitic	Cornwall.
Rust.	*Uromyces Betae* (Pers.) Tul.	Devon.

Swede.

Dry Rot	*Phoma Lingam* (Tode) Desm.	
Finger and Toe	*Plasmodiophora Brassicae* Woron.	
Mildew	*Erysiphe Polygoni* DC.	Devon.
Soft Rot	*Bacillus carotovorus* L. R. Jones	
White Spot	*Cercosporella Brassicae* (F. and R.) v. Hoehn.	Devon.

Turnip.

Downy Mildew	*Peronospora parasitica* (Pers.) Tul.	Devon.
Dry Rot	*Phoma Lingam* (Tode) Desm.	Devon.
Finger and Toe	*Plasmodiophora Brassicae* Woron.	
Leaf Spot	*Alternaria Brassicae* (Berk.) Bolle	Devon.

Turnip—Continued

Mildew	*Erysiphe Polygoni* DC.	Devon.
Soft Rot	*Bacillus carotovorus* L. R. Jones	
White Spot	*Cercosporella Brassicae* (F. and R.) v. Hoehn.	

POTATOES.

Black Dot	*Colletotrichum atramentarium* (Berk. and Br.) Taubenh.	Devon.
Black Heart	Non-parasitic	Devon.
Black Leg	*Bacillus phytophthorus* Appel	
Black Scurf	*Corticium Solani* Bourd. and Galz.	
Blight	*Phytophthora infestans* (Mont.) de Bary	
Common Scab	*Actinomyces scabies* (Thaxt.) Güss.	
Dry Rot	*Fusarium caeruleum* (Lib.) Sacc.	
Grey Mould	*Botrytis cinerea* Pers.	Cornwall.
Leaf Roll	Virus	
Mosaic	Virus	
Powdery Scab	*Spongospora subterranea* (Wallr.) Lagerh.	
Skin Spot	*Oospora pustulans* Owen and Wakef.	Devon.
Spraing	Virus	
Streak	Virus	
Violet Root Rot	*Helicobasidium purpureum* (Tul.) Pat.	Cornwall.
Wart Disease	*Synchytrium endobioticum* (Schilb.) Perc.	
White Root Rot	*Rosellinia necatrix* (Hart.) Berl.	Scilly

VEGETABLES.

Artichoke.

Sclerotinia Disease	*Sclerotinia Sclerotiorum* (Lib.) de Bary	

Beans, Broad.

Chocolate Spot	*Bacteria*	
Leaf Spot	*Ascochyta Fabae* Speg.	Devon.
Mosaic	Virus	Devon.
Rust	*Uromyces Fabae* (Pers.) de Bary	

Bean, Dwarf or French.

Anthracnose	*Colletotrichum Lindemuthianum* (Sacc. and Magn.) Bri. and Cav.	
Foot Rot	*Fusarium Solani* (Mart.) *var. Martii* (Appel and Wr.) Wr.	Cornwall.
Grey Mould	*Botrytis cinerea* Pers.	Devon.
Halo Blight	*Bacterium Medicaginis* E. F. Sm. *var. phaseolicola* Link and Hull	Cornwall.

Bean, Runner.		
Grey Mould	*Botrytis cinerea* Pers.	Devon.
Halo Blight	*Bacterium Medicaginis* E. F. Sm. *var. phaseolicola* Link and Hull	Cornwall.
Beet, Garden.		
Heart Rot	Non-parasitic	Devon.
Rust	*Uromyces Betae* (Pers.) Tul.	
Beet, Spinach.		
Rust	*Uromyces Betae* (Pers.) Tul.	Cornwall.
Broccoli.		
Canker	*Phoma Lingam* (Tode) Desm.	Devon.
Club Root	*Plasmodiophora Brassicae* Woron.	
Damping Off	*Pythium de Baryanum* Hesse	Devon.
Downy Mildew	*Peronospora parasitica* (Pers.) Tul.	
Leaf Spot	*Ascochyta Brassicae* Thum.	Devon.
Leaf Spot	*Gloeosporium concentricum* (Grev.) Berk. and Br.	Devon.
Ring Spot	*Mycosphaerella brassicicola* (Fr.) Lindau	Devon.
Soft Rot	*Bacillus carotovorus* L. R. Jones	
White Blister	*Cystopus candidus* (Pers.) de Bary	
Brussels Sprouts.		
Club Root	*Plasmodiophora Brassicae* Woron.	
Ring Spot	*Mycosphaerella brassicicola* (Fr.) Lindau	
White Blister	*Cystopus candidus* (Pers.) de Bary	
Cabbage.		
Club Root	*Plasmodiophora Brassicae* Woron.	
Downy Mildew	*Peronospora parasitica* (Pers.) Tul.	
Grey Mould	*Botrytis cinerea* Pers.	
Powdery Mildew	*Erysiphe Polgoni* DC.	Devon.
Ring Spot	*Mycosphaerella brassicicola* (Fr.) Lindau	
Soft Rot	*Bacillus carotovorus* L. R. Jones	Cornwall.
White Blister	*Cystopus candidus* (Pers.) de Bary	Devon.
Carrot.		
Sclerotinia Rot	*Sclerotinia Sclerotiorum* (Lib.) de Bary	
Cauliflower.		
Club Root	*Plasmodiophora Brassicae* Woron.	Devon.
Leaf Spot	*Gloesporium concentricum* (Grev.) Berk. and Br.	Devon.
Ring Spot	*Mycosphaerella brassicicola* (Fr.) Lindau	Devon.
Soft Rot	*Bacillus carotovorus* L. R. Jones	
White Blister	*Cystopus candidus* (Pers.) de Bary	Devon.

Celery.		
Leaf Spot	*Septoria Apii* Chester	
Soft Rot	*Bacillus carotovorus* L. R. Jones	Devon.
Cucumber.		
*Blotch	*Cercospora Melonis* Cooke	Devon.
Foot Rot	*Bacillus carotovorus* L. R. Jones	
*Fusarium Wilt	*Fusarium sp.*	
Grey Mould	*Botrytis cinerea* Pers.	
Gummosis	*Cladosporium cucumerinum* Ell. & Arth.	Devon.
Mildew	*Erysiphe Cichoracearum* DC.	
Physiological		
Damping Off	Non-parasitic	Devon.
Verticillium Wilt	*Verticillium albo-atrum* Reinke and Berth.	Devon.
Dwarf Beans.		
	See **Beans,** Dwarf	
Endive.		
Leaf Spot	*Pleospora herbarum* (Pers.) Rab.	Cornwall.
Ring Spot	*Marssonina panattoniana* (Berl.) Magn.	Cornwall.
Kale.		
Powdery Mildew	*Erysiphe Polygoni* DC.	Devon.
Ring Spot	*Mysosphaerella brassicola* (Fr.) Lindau	Cornwall.
White Blister	*Cystopus candidus* (Pers.) de Bary	Scilly.
Leek.		
Rust	*Puccinia Porri* (Sow.) Wint.	
Lettuce.		
Bacterial Spot	*Bacterium marginale* N. A. Brown	
Downy Mildew	*Bremia Lactucae* Regel	
Grey Mould	*Botrytis cinerea* Pers.	
Leaf Spot	*Pleospora herbarum* (Pers.) Rab.	Devon.
Ring Spot	*Marssonina panattoniana* (Berl.) Magn.	
Tip Burn	Non-parasitic	Devon.
Marrow.	See **Vegetable Marrow**	
Mint.		
Rust	*Puccinia Menthae* Pers.	
Onion.		
Downy Mildew	*Peronospora Schleideniana* W. G. Sm.	
Neck Rot	*Botrytis Allii* Munn	Devon.
Soft Rot	*Bacillus carotovorus* L. R. Jones	Devon.
White Rot	*Sclerotium cepivorum* Berk.	Devon.

Parsnip.

Canker	Non-parasitic	
Grey Mould	*Botrytis cinerea* Pers.	Devon.

Pea.

Downy Mildew	*Peronospora Viciae* (Berk.) de Bary	Devon.
Foot Rot	*Fusarium Martii* App. and Wr.	Devon.
Mildew	*Erysiphe Polygoni* DC.	
Root Rot	*Aphanomyces euteiches* Drechsl.	Devon.
Root Rot	*Thielaviopsis basicola* (Berk.) Ferr.	
Spot	*Ascochyta Pisi* Lib.	
Stem Rot	*Mycosphaerella pinodes* (Berk. and Blox.) Niessl	Devon.

Salsify.

*White Blister	*Cystopus cubicus* (Strauss) de Bary	Devon.

Shallots.

White Rot	*Sclerotium cepivorum* Berk.	Devon.

Spinach Beet. See Beet.

Swede.

Mildew	*Erysiphe Polygoni* DC.	Devon.

Tomato.

Blight	*Phytophthora infestans* (Mont.) de Bary	Devon.
Blossom End Rot	Non-parasitic	
Blotchy Ripening	Non-parasitic	
Foot Rot and Damping Off	*Phytophthora cryptogea* Pethybr. and Laff.	
*Foot Rot	*Corticium Solani* Bourd. and Galz.	Devon.
Greenback	Non-parasitic	
Grey Mould	*Botrytis cinerea* Pers.	
Leaf Mould	*Cladosporium fulvum* Cooke	
Mosaic	Virus	
*Oedema	Non-parasitic	Devon.
Sleepy Disease	See Verticillium Wilt	
Spotted Wilt	Virus	
Streak	Virus	
*Yellow Mosaic	Virus	Devon.
Verticillium Wilt	*Verticillium albo-atrum* Reinke and Berth.	

Turnip.		
Dry Rot	*Phoma Lingam* (Tode) Desm.	Devon.
Soft Rot	*Bacillus carotovorus* L. R. Jones	Devon.
White Blister	*Cystopus candidus* (Pers.) de Bary	Devon.
Vegetable Marrow.		
Mildew	*Erysiphe Cichoracearum* DC.	
Apple.	**FRUIT.**	
Bitter Pit	Non-parasitic	Devon.
Bitter Rot	*Gloeosporium fructigenum* Berk.	Devon.
Bitter Rot	*Gloeosporium album* Osterw.	
Blossom Wilt	*Sclerotinia laxa* (Aderh. and Ruhl.) forma *mali* Worm.	
Blue Mould	*Penicillium expansum* Thom	Devon.
Brown Rot	*Sclerotinia fructigena* Aderh. and Ruhl.	
Bud Rot	*Fusarium lateritium* Nees var. *fructigenum* (Fr.) Wr.	Devon.
Canker and Eye Rot	*Nectria galligena* Bres.	
" Cox Spot "	Unknown	
Crown Gall	*Bacterium tumefaciens* E. F. Sm. and Towns.	Devon.
Die Back	*Cytospora spp.*, etc.	
Glassiness	Non-parasitic	
Leaf Scorch	Non-parasitic	
Leaf Spot	*Phyllosticta sp.*	
Mildew	*Podosphaera leucotricha* (Ell. and Everh.) Salm.	
Phytophthora Rot	*Phytophthora Cactorum* (Leb. and Cohn) Schroet.	
Root Rot	*Armillaria mellea* (Vahl) Fr.	
Scab	*Venturia inaequalis* (Cooke) Wint.	
Scald	Non-parasitic	
Silver Leaf	*Stereum purpureum* Pers.	
Sooty Blotch	Unknown fungus	
Storage Fruit Rot	*Diaporthe perniciosa* Marchal	Devon.
Storage Fruit Spot	*Polyopeus spp.*, etc.	
*Surface Canker	*Myxosporium corticola* Edgert.	Devon.
Apricot.		
Leaf Curl	*Taphrina deformans* (Berk.) Tul.	Devon.
*Rust	*Puccinia Pruni-spinosae* Pers.	Devon.
*Silver Leaf	*Stereum purpureum* Pers.	Devon.

Blackberry.

Leaf Scorch	Non-parasitic	Devon.
Leaf and Cane Spot	*Elsinoe veneta* (Burkh.) Jenk.	Devon.

Black Currant.

American Mildew	*Sphaerotheca mors-uvae* (Schw.) Berk.	Devon.
Leaf Spot	*Pseudopeziza Ribis* Kleb.	
Reversion	Virus	
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.
Rust	*Cronartium ribicola* J. C. Fischer	
*Silver Leaf	*Stereum purpureum* Pers.	Devon.

Cherry.

Blossom Wilt and Brown Rot	*Sclerotinia laxa* Aderh. and Ruhl.	
Leaf Curl	*Taphrina minor* Sadeb.	
Leaf Scorch	*Gnomonia erythrostoma* (Pers.) Auersw.	
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.
Shot Hole	Fungi and bacteria	
Silver Leaf	*Stereum purpureum* Pers.	Devon.
Witches Brooms	*Taphrina Cerasi* (Fuck.) Sadeb.	Devon.

Fig.

Coral Spot	*Nectria cinnabarina* (Tode) Fr.	
Grey Mould	*Botrytis cinerea* Pers.	

Gooseberry.

American Mildew	*Sphaerotheca mors-uvae* (Schw.) Berk.	
Black Pustule	*Plowrightia ribesia* (Pers.) Sacc.	
Cluster Cup Rust	*Puccinia Pringsheimiana* Kleb.	
Die Back	*Botrytis cinerea* Pers.	
European Mildew	*Microsphaera Grossulariae* (Wallr.) Lév.	
Leaf Scorch	Non-parasitic	
Leaf Spot	*Pseudopeziza Ribis* Kleb.	
Root Rot	*Armillaria mellea* (Vahl) Fr.	
Silver Leaf	*Stereum purpureum* Pers.	
White Root Rot	*Rosellinia necatrix* (Hart.) Berl.	Devon.

Grape Vine.

Grey Mould	*Botrytis cinerea* Pers.	Devon.
Malnutrition	Non-parasitic	Devon.
Mildew	*Uncinula necator* (Schw.) Burr.	
Root Rot	*Armillaria mellea* (Vahl) Fr.	
Shanking	Non-parasitic	

Loganberry.		
Leaf and Cane Spot	*Elsinoe veneta* (Burkh.) Jenk.	
Interveinal Leaf Scorch	Non-parasitic	Devon.
Rust	*Phragmidium violaceum* (Schultz) Wint.	Devon.
Nectarine.		
Leaf Curl	*Taphrina deformans* (Berk.) Tul.	
*Rust	*Puccinia Pruni-spinosae* Pers.	Devon.
Peach.		
Brown Rot	*Sclerotinia fructigena* Aderh. and Ruhl.	Devon.
Bud Canker	See Shothole	
Die Back	Non-parasitic	
Grey Mould	*Botrytis cinerea* Pers.	Devon.
Leaf Curl	*Taphrina deformans* (Berk.) Tul.	
Mildew	*Sphaerotheca pannosa* (Wallr.) Lév. var. *persicae* Woron.	Devon.
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.
*Rust	*Puccinia Pruni-spinosae* Pers.	Devon.
Scab	*Cladosporium carpophilum* Thuem.	Devon.
Shothole	*Clasterosporium carpophilum* (Lév.) Aderh.	
Silver Leaf	*Stereum purpureum* Pers.	Devon.
White Root Rot	*Rosellinia necatrix* (Hart.) Berl.	Devon.
Pear.		
Blossom Wilt	*Sclerotinia laxa* Aderh. and Ruhl.	
Brown Rot	*Sclerotinia fructigena* Aderh. and Ruhl.	
Canker and Eye Rot	*Nectria galligena* Bres.	Devon.
Leaf Blackening	Non-parasitic	
Leaf Fleck	*Mycosphaerella sentina* (Fr.) Schroet.	Devon.
Lithiasis	Non-parasitic	Devon.
Scab	*Venturia pirina* Aderh.	
Plum.		
Bacterial Canker	*Pseudomonas mors-prunorum* Worm.	
Blossom Wilt	See Wither Tip	
Brown Rot	*Sclerotinia fructigena* Aderh. and Ruhl.	
Die Back	Various fungi	
Fomes Disease	*Fomes pomaceus* (Pers.) Lloyd	
Gummosis	Non-parasitic	
*Pocket Plums	*Taphrina Pruni* (Fuck.) Tul.	Devon.
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.

Plum.—Continued.

Rust	*Puccinia Pruni-spinosae* Pers.	
Shot Hole	Various fungi	
Silver Leaf	*Stereum purpureum* Pers.	
Wither Tip	*Sclerotinia laxa* Aderh. and Ruhl.	

Quince.

Leaf Blight	*Fabraea maculata* Atk.	Devon.

Raspberry.

Blue Stripe Wilt	*Verticillium Dahliae* Kleb.	Devon.
Cane Spot	*Elsinoe veneta* (Burkh.) Jenk.	
Mildew	*Sphaerotheca Humuli* (DC.) Burr.	Devon.
Mosaic	Virus	
Rust	*Phragmidium Rubi-Idaei* (Pers.) Karst.	
Spur Blight	*Didymella applanata* (Niessl) Sacc.	

Red Currant.

American Mildew	*Sphaerotheca mors-uvae* (Schw.) Berk.	Devon.
Black Pastule	*Plowrightia ribesia* (Pers.) Sacc.	Devon.
Leaf Spot	*Pseudopeziza Ribis* Kleb.	Devon.
*Silver Leaf	*Stereum purpureum* Pers.	Cornwall.

Strawberry.

Leathery Rot	*Phytophthora Cactorum* (Leb. and Cohn) Schroet.	
Grey Mould	*Botrytis cinerea* Pers.	Devon.
Leaf Spot	*Mycosphaerella Fragariae* (Tul.) Lindau	
Leaf Scorch	*Marssonina Fragariae* (Sacc.) Kleb.	
Mildew	*Sphaerotheca Humuli* (DC.) Burr.	
Patch	Unknown	
Sudden Wilt	Unknown	
Yellow Edge	Virus	

Walnut.

Blotch	*Marssonina Juglandis* (Lib.) Magn.	Devon.
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.

FLOWERS AND ORNAMENTAL SHRUBS.

Amaryllis	See Belladonna

Anemone

Rust	*Puccinia Pruni-spinosae* Pers.
"Weather Browning"	Unknown

Antirrhinum See Snapdragon

Arabis albida.

White Blister	*Cystopus candidus* (Pers.) de Bary	Devon.

Arum.

Corm Rot	*Bacillus Aroideae* Towns.	Devon.
Leaf Spot	*Phyllosticta Richardiae* F. T. Brooks	
White Root Rot	*Rosellinia necatrix* (Hart.) Berl.	Scilly.

Aster, China.

Foot Rot	*Phytophthora cryptogea* Pethybr. and Laff.	Devon.
*Wilt	*Fusarium sp.*	Devon.

Azalea.

Gall	*Exobasidium Vaccinii* (Fuck.) Woron.	
Grey Mould	*Botrytis cinerea* Pers.	

Belladonna Lily.

Leaf Scorch	*Stagonospora Curtisii* (Berk.) Sacc.	Devon.

Box.

Rust	*Puccinia Buxi* DC.	Devon.

Calendula.

Smut	*Entyloma Calendulae* de Bary	Cornwall.
Mildew	*Erysiphe sp.* ? *Cichoracearum* DC.	

Campanula media.

Brown Wilt	*Sclerotinia Sclerotiorum* (Lib.) de Bary	Devon.

Canna indica.

Root Rot	*Armullaria mellea* (Vahl) Fr.	Devon.

Carnation.

Leaf Rot	*Heteropatella valtellinensis* (Trav.) Wr.	Devon.
Mildew	*Oidium sp.*	
Ring Spot	*Heterosporium echinulatum* (Berk.) Cooke	
Rust	*Uromyces Dianthi* (Pers.) Niessl	Devon.
Wilt	*Fusarium spp.*	

Cherry, Double Flowering.

Shothole	*Clasterosporium carpophilum* (Lév.) Aderh.	Devon.

Cherry Laurel.

Silver Leaf	*Stereum purpureum* Pers.	

Chrysanthemum.

Grey Mould	*Botrytis cinerea* Pers.	Devon.
Mildew	*Oidium Chrysanthemi* Rabenh.	Devon.
Rust	*Puccinia Chrysanthemi* Roze	

Chrysanthemum maximum.

Blotch	*Septoria chrysanthemella* Sacc.	Cornwall.

Cupressus macrocarpa.

Sooty Mould	*Dematium pullulans* de Bary	Devon.

Dahlia.

Leaf Spot	*Entyloma Dahliae* Syd.	Devon.

Delphinium.

Black Blotch	*Bacterium Delphinii* Bryan	
Mildew	*Erysiphe Polygoni* DC.	Devon.

Erica.

Sooty Mould	Unknown Fungus	Cornwall.

Euonymus japonicus.

*Grey Mould	*Botrytis cinerea* Pers.	Cornwall.
*Leaf Spot	*Phyllosticta subnervisequa* Desm.	Cornwall.
Mildew	*Oidium Euonymi-japonicae* (Arcang.) Sacc.	
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.

Freesia.

Mosaic	Virus	Devon.

Gladiolus.

Dry Rot	*Sclerotium Gladioli* Massey	
Hard Rot and Leaf Spot	*Septoria Gladioli* Pass.	
Rust	*Puccinia Gladioli* Cast.	Cornwall.
Scab	*Bacterium marginatum* McCulloch	Devon.
Storage Rot	*Penicillium Gladioli* Machacek	Devon.

Hawthorn.

Mildew	*Podosphaera leucotricha* (Ell. and Everh.) Salm.	Devon.

Helichrysum.

Grey Mould	*Botrytis cinerea* Pers.	Cornwall.

Helleborus (Christmas Rose).

Leaf Spot	*Coniothyrium Hellebori* Cooke and Massee	

Heuchera.

Root Rot	*Armillaria mellea* (Vahl) Fr.	Cornwall.

Hollyhock.

Rust	*Puccinia Malvacearum* Mont.	

Honeysuckle.

Leaf Spot	*Leptothyrium Periclymeni* Desm.	Devon.

Hyacinth.

Soft Rot	*Bacillus carotovorus* L. R. Jones	Devon.

Iris.

Ink Disease	*Mystrosporium adustum* Mass.	
Leaf Spot	*Heterosporium gracile* Sacc.	
Soft Rot	*Bacillus carotovorus* L. R. Jones	Devon.
Stripe	Virus (?)	
White Root Rot	*Rosellinia necatrix* (Hart.) Berl.	Cornwall.

Ixia.

*Bulb Rot	*Rosellinia necatrix* (Hart.) Berl.	Scilly.

Lilac.

Root Rot	*Armillaria mellea* (Vahl) Fr.	Cornwall.

Lily.

Lily Disease	*Botrytis elliptica* (Berk.) Cooke	

Lily of the Valley.

Fire	*Botrytis Paeoniae* Oud.	Devon.

Lonicera nitida.

Silvering	Cold weather	Devon.

Michaelmas Daisy.

Mildew	*Erysiphe Cichoracearum* DC.	Devon.
Wilt	*Verticillium Vilmorinii* Westerd. and van Luijk	Devon.

Marigold. See Calendula

Muscari.		
Soft Rot	*Bacillus carotovorus* L. R. Jones	Cornwall.
Myosotis.		
Mildew	*Erysiphe Cichoracearum* DC.	Devon.
Narcissus.		
Black Bulb Rot	*Rosellinia necatrix* (Hart.) Berl.	Cornwall.
Fire	*Botrytis polyblastis* Dows.	
Leaf Scorch	*Stagonospora Curtisii* (Berk.) Sacc.	
Root Rot	*Cylindrocarpon radicicola* Wr.	
Root Plate Rot	*Cylindrocarpon radicicola* Wr.	
Storage Bulb Rot	*Fusarium bulbigenum* Cooke and Massee	
Stripe	Virus (?)	
Smoulder	*Botrytis narcissicola* Kleb.	
White Mould	*Ramularia Vallisumbrosae* Cav.	
Paeony.		
Root Rot	*Armillaria mellea* (Vahl) Fr.	Cornwall.
Wilt	*Botrytis Paeoniae* Oud.	
Pansy.		
Rust	*Puccinia aegra* Grove	Devon.
Pelargonium.		
Black Leg	*Pythium spp.*	Devon.
Grey Mould	*Botrytis cinerea* Pers.	Devon.
Petunia.		
*Black Root Rot	*Thielaviopsis basicola* (Berk.) Ferraris	Devon.
Pittosporum.		
Brown Spot	Unknown	Cornwall.
Plane.		
Leaf Scorch	*Gloeosporium nervisequum* (Fuck.) Sacc.	Devon.
Portugal Laurel.		
Silver Leaf	*Stereum purpureum* Pers.	Devon.
Privet.		
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.
Rhododendron.		
Leaf Scorch	*Gloeosoporium Rhododendri* Bri. and Cav.	Cornwall.

Rose.		
Black Spot	*Diplocarpon Rosae* Wolf	Devon.
Grey Mould	*Botrytis cinerea* Pers.	Devon.
Mildew	*Sphaerotheca pannosa* (Wallr.) Lév.	
Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.
Rust	*Phragmidium mucronatum* (Pers.) Schlecht.	Devon.
Stalk Blackening	Unknown	Devon.
Scilla campanulata.		
Rust	*Uromyces Scillarum* Wint.	Devon.
Shasta Daisy.	See Chrysanthemum maximum	
Snapdragon.		
Mildew	*Oidium sp.*	Devon.
Rust	*Puccinia Antirrhini* Diet. and Holw.	
*Shothole	*Heteropatella Antirrhini* Budd. and Wakef.	Cornwall.
Stem Rot	*Phyllosticta Antirrhini* Syd.	Cornwall.
*Wilt	*Verticillium spp.*	Devon.
Statice.		
Grey Mould	*Botrytis cinerea* Pers.	Cornwall.
*Root Rot	*Armillaria mellea* (Vahl) Fr.	Devon.
Stock.		
*Downy Mildew	*Peronospora parasitica* (Pers.) Tul.	Cornwall.
*Leaf Spot	*Septoria Henriquesii* Thüm.	Cornwall.
Sweet Pea.		
Streak	Virus	
White Mould	*Erostrotheca multiformis* Martin and Charles	Devon.
Sweet William.		
Leaf Spot	*Heterosporium echinulatum* (Berk.) Cooke	Devon.
Leaf Spot	*Ascochyta Dianthi* Berk.	
Rust	*Puccinia Lychnidearum* Link f. *Dianthi* Grove	
Thuja.		
Thuja Disease	*Keithia thujina* Dur.	Devon.
Tulips.		
Breaking	Virus	
Chalkiness	Unknown	

Tulips.—Continued.

Fire	*Botrytis Tulipae* (Lib.) Lind	
Greenhouse Leaf Spot	*Fusarium tubercularioides* (Cda.) Sacc.	
Storage Rot	*Penicillium spp.*	

Veronica.

Leaf Spot	*Septoria exotica* Speg.	

Viola.

Rust	*Puccinia aegra* Grove	Devon.

Violet.

Leaf Spot	*Phyllosticta Violae* Desm.	
Rust	*Puccinia Violae* (Schum.) DC.	Devon.
Smut	*Urocystis Violae* (Sow.) Fisch. v. Waldh.	Devon.

Wallflower.

Downy Mildew	*Peronospora parasitica* (Pers.) Tul.	

Yucca.

Leaf Spot	*Coniothyrium concentricum* (Desm.) Sacc.	Devon.

Zinnia.

Blossom Wilt	*Botrytis cinerea* Pers.	Cornwall.

MISCELLANEOUS.

Elm.

Elm Disease	*Graphium Ulmi* Schwarz	

Flax.

*Rust	*Melampsora Lini* (Pers.) Desm.	Cornwall.

Lawns.

Green Slime	*Nostoc spp.*	Devon.
Pink Rot	*Corticium fuciforme* (Berk.) Wakef.	Devon.
Snow Mould	*Fusarium nivale* (Fr.) Ces.	Devon.

Willow.

Black Canker	*Physalospora Miyabeana* Fukushi	Devon.
Rust	*Melampsora sp.*	Devon.

Rhubarb.

Root Rot	*Armillaria mellea* (Vahl) Fr.	Cornwall.
*Rust	*Puccinia Phragmitis* (Schum.) Koern.	

Seale-Hayne College Pamphlets.

Pamphlet 3. The Charlock Danger.
" 4. The Feeding of Cows in Relation to Milk Production.
" 5. Plants Poisonous to Stock and First Aid.
" 6. Tariff of Analyses.
" 7. Field Experiments for 1922. (Out of Print).
" 8. Simple Farm Book-keeping for Income Tax Purposes. (Out of Print).
" 9. Feeding Potatoes to Pigs.
" 10. First Report on the Cost of Food in Milk Production in Devon and Cornwall. (Out of Print).
" 11. Milk Tainting Plants and Some Stored Milk Troubles.
" 12. Second Report on the Cost of Food in Milk Production in Devon and Cornwall.
" 13. Variety Trial with Oats.
" 14. Spotted Medick.
" 15. Potato Variety Trials, 1924.
" 16. First Annual Report of the Department of Plant Pathology.
" 17. Cost of Milk Production. (3rd Report). (Out of Print).
" 18. Potato Variety Trials, 1925.
" 19. Second Annual Report of the Department of Plant Pathology.
" 20. Potato Variety Trials, 1926.
" 21. Third Annual Report of the Department of Plant Pathology.
" 22. Purity of Strain in Red Clover.
" 23. Economic Investigation of Devon and Cornish Farms.
" 24. Variety Trials with Potatoes. Four years. (Final Report). (Out of Print).
" 25. Fourth Annual Report of the Department of Plant Pathology.
" 26. Grassland Management. (Out of Print).
" 27. Report of Advisory Departments.
" 28. Tables of Composition, Nutritive and Manurial Values of Food.
" 29. Report on the Elimination from a Dairy Herd of Cows reacting to the Tuberculin Test.
" 30. Fifth Annual Report of the Department of Plant Pathology.
" 31. Sixth Annual Report of the Department of Plant Pathology.
" 32. The Manufacture of Butter.
" 33. Sugar Beet Costs in Devon and Cornwall.
" 34. Guide to Exhibit at the World's Poultry Congress (1930).
" 35. Clotted Cream.
" 36. Seventh Annual Report of the Department of Plant Pathology.
" 37. Eighth Annual Report of the Department of Plant Pathology.
" 38. A Study of Livestock Movements in Cornwall and Devon.
" 39. Bacillary White Diarrhoea of Poultry.
" 40. Ninth Annual Report of the Department of Plant Pathology.
" 41. Labour Requirements of Crops and Stock in the South-West.
" 42. Tenth Annual Report of the Department of Plant Pathology.
" 43. Changes in Permanent Equipment of South Devon Farms.

W. HENDERSON HOGG.
July, 1935. *Principal.*